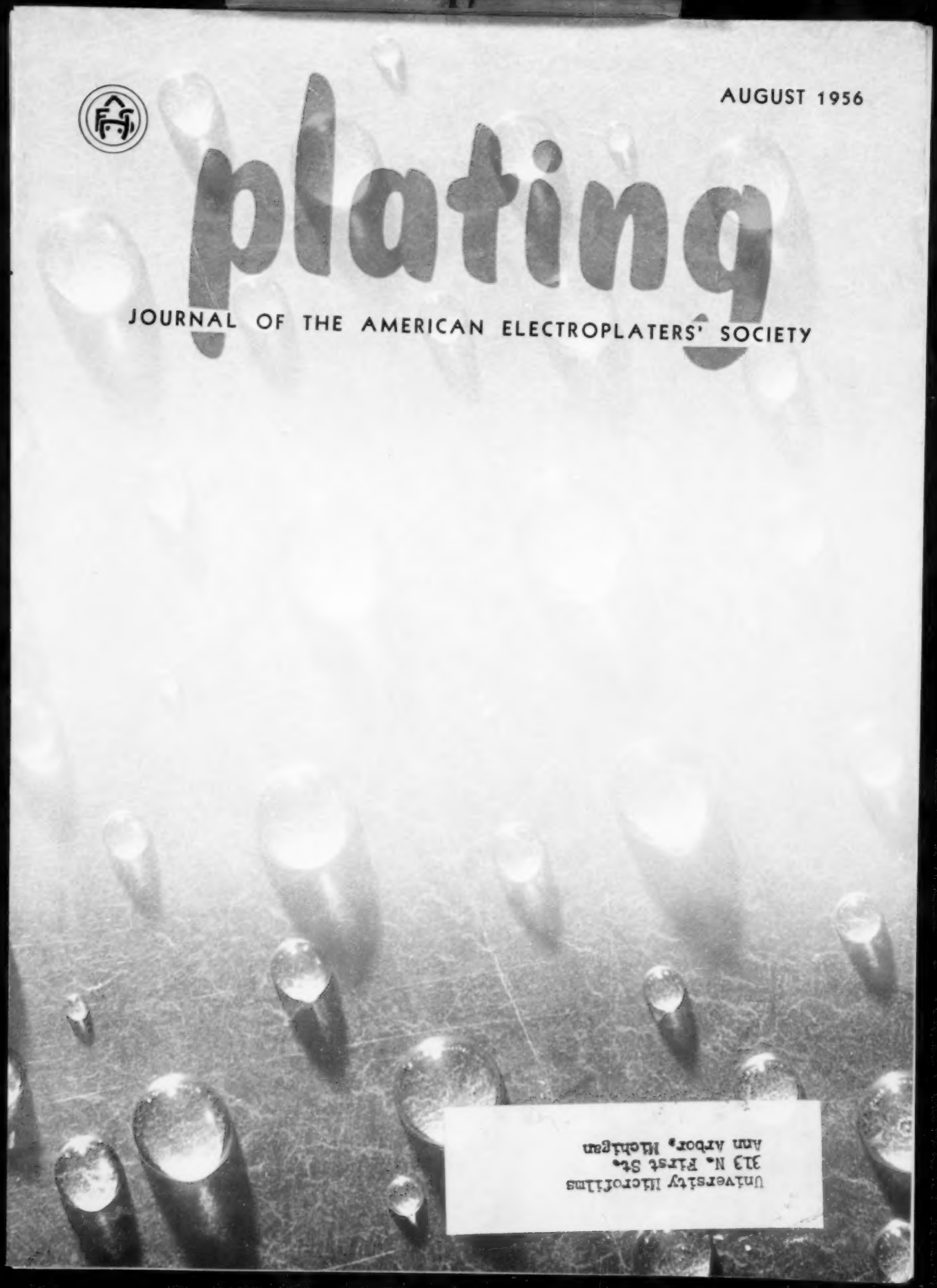

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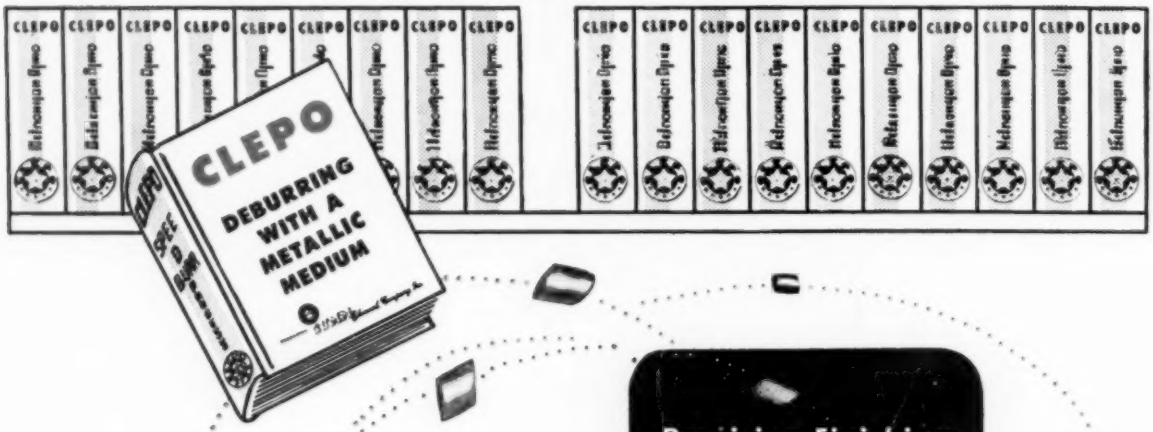

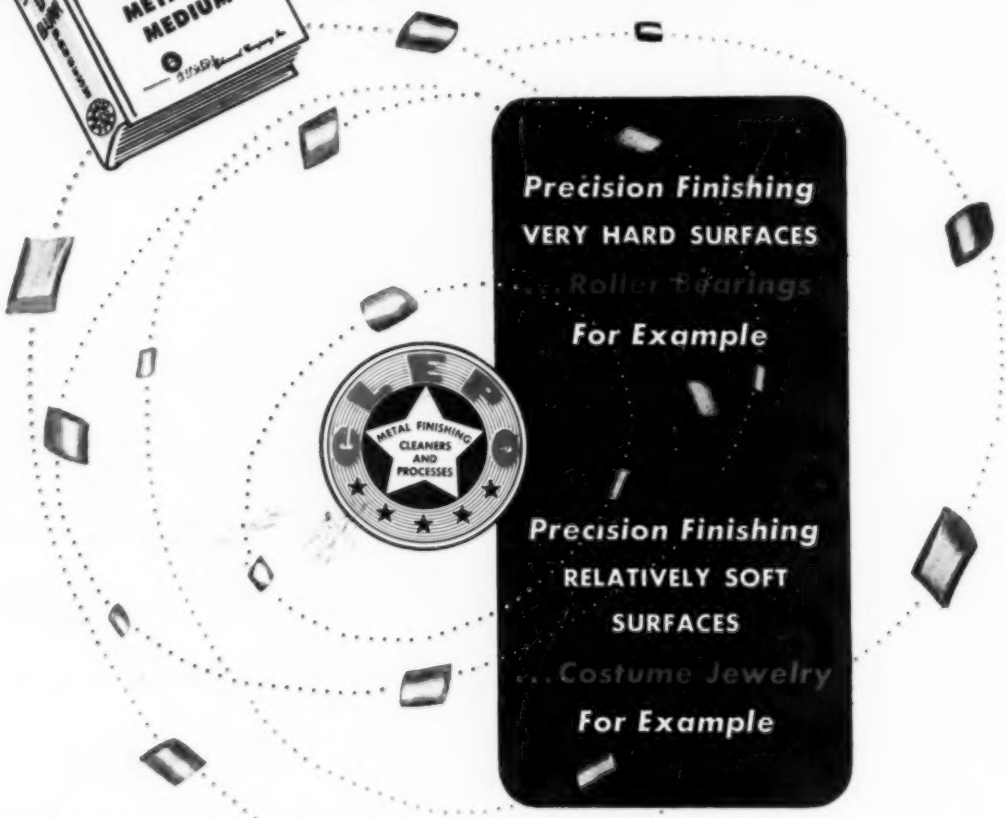

The CLEPO Spee-D-Burr Process can do both. It's exceptionally versatile. Using uniformly-sized zinc barrel-shaped slugs, this process produces a rather unique tumbling action. Contacts are surface to surface rather than point or edge to surface as is usually the case with non-metallic deburring media. Tendency to scratch, gouge or otherwise mar the surface is eliminated. Uniform high polish precision finishes can be obtained over a wide range of metal hardness — in one operation where the steels are concerned; followed by a ball burnishing operation on the non-ferrous metals.

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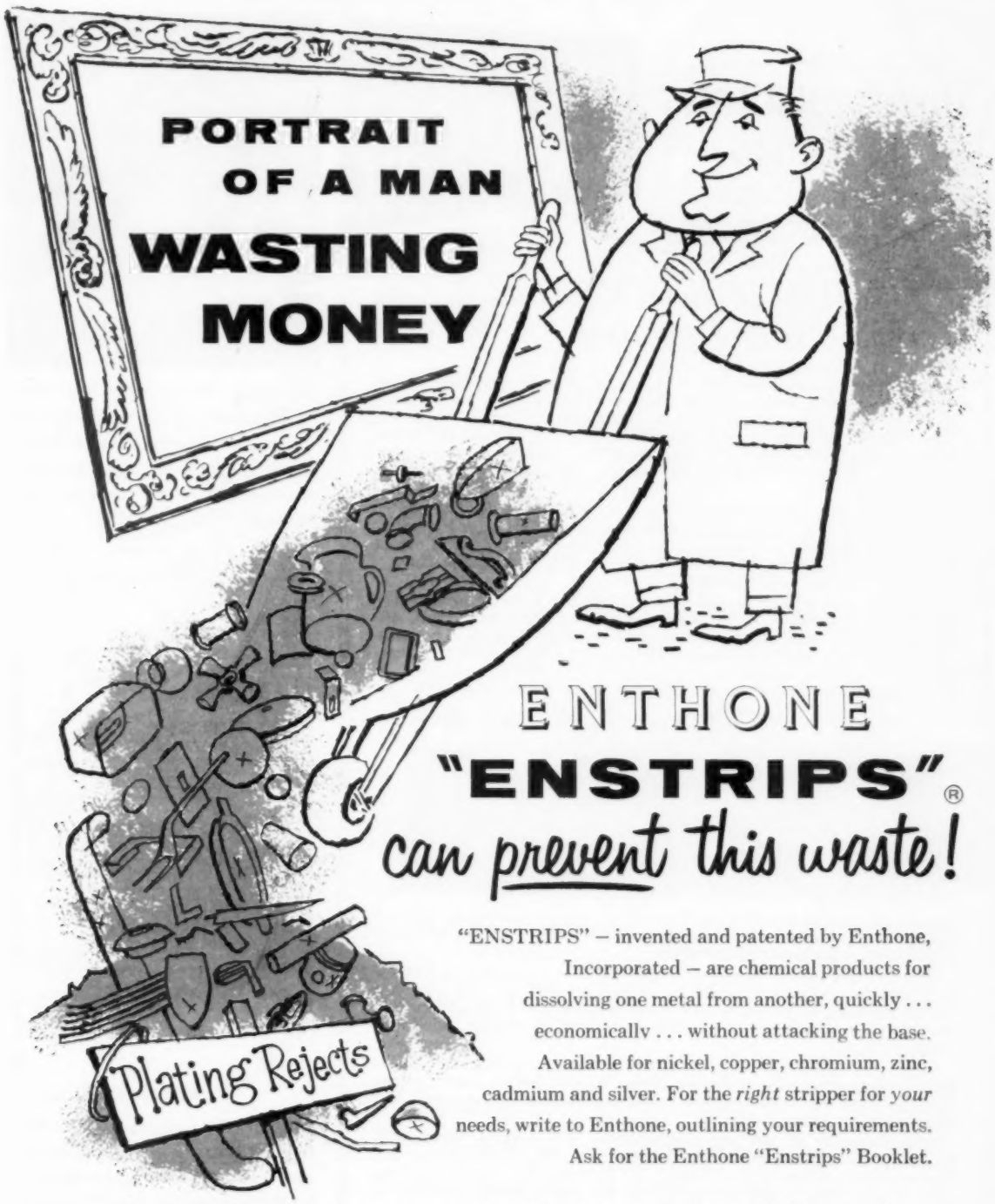

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by Guy A. Cummings
Metal Finishing Sales Manager
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Let us tell you how the Stevens Automatic Barrel Plating Machines can help you. They are used for zinc, cadmium, nickel, brass plating of such small parts as screws, bolts, nuts and stampings, and also a wide variety of bulk immersion processes such as phosphatizing, washing, pickling, and chromating.

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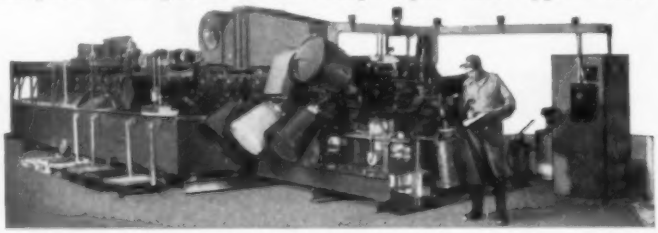

covers. By raising or lowering the cylinder the parts slide in and out without the necessity of unclamping and removing covers normally needed for horizontal type cylinders.

The Stevens simple compact design makes it economically feasible to purchase production capacities as high as 4000 pounds per hour in one machine, or just as practical to distribute the capacity between two or more machines to provide flexibility in plating thickness, production, etc.

Here are other advantages in using Stevens Automatic Barrel Machines—uniformity of deposit, fewer rejects, better working conditions, easier chemical control, better scheduling and delivery and *lower costs per piece.*

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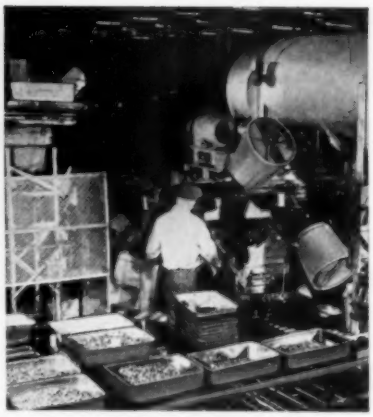
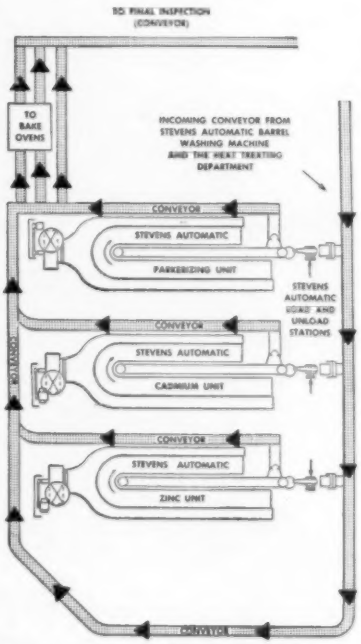


Showing Automatic Loading Device and Automatic Barrel Unloading Station on Stevens Automatic Barrel Processing Machine, incorporated as part of the Straight-Flow operation.



Millions of small stamped fastening devices, pre-assembled screws and nuts, and twisted-tooth lockwashers are automatically washed, parkerized, zinc and cadmium plated in Stevens Automatic Barrel Processing Equipment annually at this modern plant. Cleaner operation, fewer rejects and better control of plating thickness are some of the advantages being realized by the operators.

An Educational Society for the Advancement of the Science of Electroplating, the Finishing of Metals and Allied Arts

plating

Journal of the American Electroplaters' Society

August 1956 **Vol. 43, No. 8**

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Advertising Manager

Lee F. O'Connell
111 N. LaCienega Blvd., Beverly Hills, Calif., OLympia 2-1313

William Ayres
Lee F. O'Connell Co.
233 Sansome St., San Francisco 4, Calif. YUkon 6-2981
Western Advertising Representatives

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SOCIETY of BUSINESS MAGAZINE EDITORS

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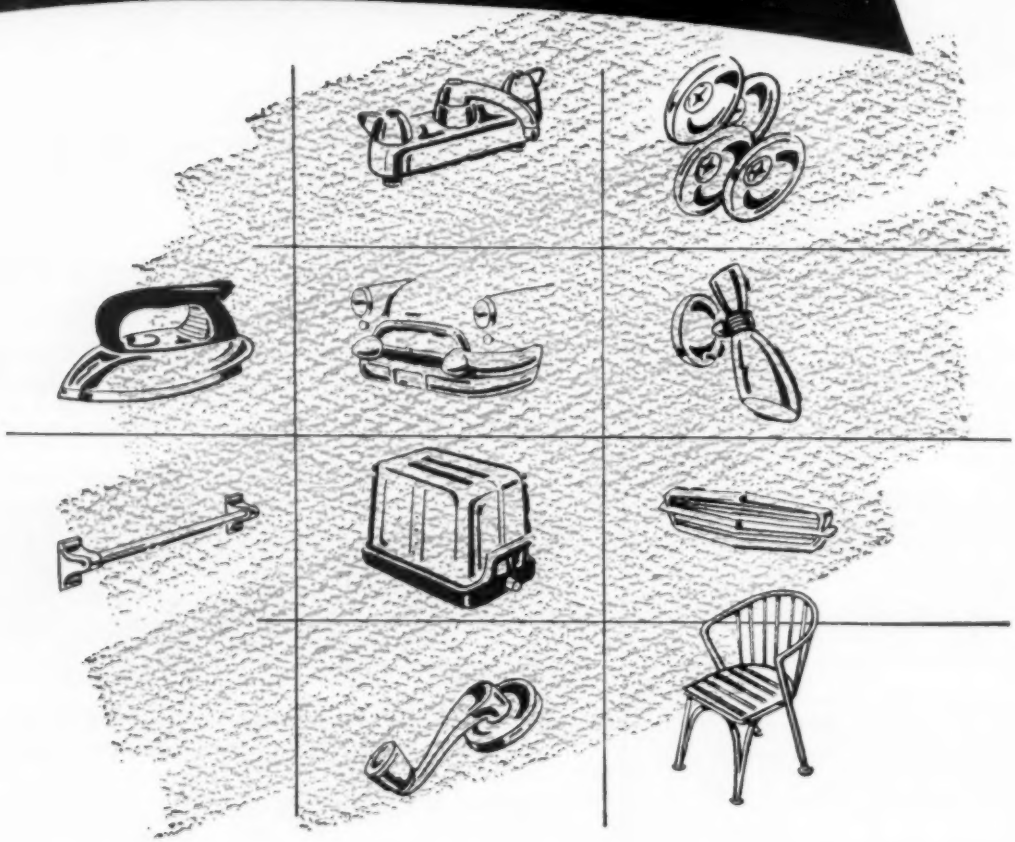

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EDITORIAL

WATER AND WASTE

The metal finishing industries use a large variety of materials in their processes. There is much concern over the cost, supply, purity, quality and availability of these materials. It is startling perhaps to realize that water is the largest single item used by the metal finisher. In tonnage, it surpasses all the other materials.

The ultimate cost of manufacture and operation is directly affected by water. The quality of the product is also directly dependent on water. Such is human nature that all too many of the men in the field take this precious ingredient for granted. Still, impurities in the water have jolting effects on the behavior of plating baths. No one would discount the staggering burden placed on a finishing process by waterspotting, brittleness, porosity, roughness of deposit, reduction of throwing power, streakiness, pitting, staining, etc., etc.

It is true that plating wastes volume is comparatively not large, but the intolerable toxicity, the corrosive action on sewers, and the fatal effect on biological processes in the sewage disposal plant make plating wastes a terrible burden.

If industry is to guarantee to itself adequate supplies of clean water, each individual plant owner must become keenly aware of his own responsibility. The indifference towards safe, clean water prevailed well into the 20th century, but there has been a gradual increase in the consciousness of the need for good water. Today, with Government, technical societies, independent companies, and special task groups working constantly towards better water supplies, there is the beginning of education, the start of awareness. At long last there begins to appear an increasingly clear definition of our lack of knowledge and action in regard to water.

Industry generally has come to realize more and more that one of the most efficient ways to obtain water is to reuse it. This pays a double dividend. It protects streams and water supplies from pollution, reclaims many valuable materials from the waste and returns the water in a usable condition. This is good business, good housekeeping and excellent public relations.

The development of processes, machinery, chemicals and methods with which this is accomplished has been moving forward rapidly in recent years. It is with the frank hope that the metal finishing industries can pool their thoughts, ideas and approaches in the pages of PLATING that the editors devote an entire issue to water purification and waste disposal.

THE EDITOR

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For that tough cutting down job on steel or stainless steel, solve your problem with

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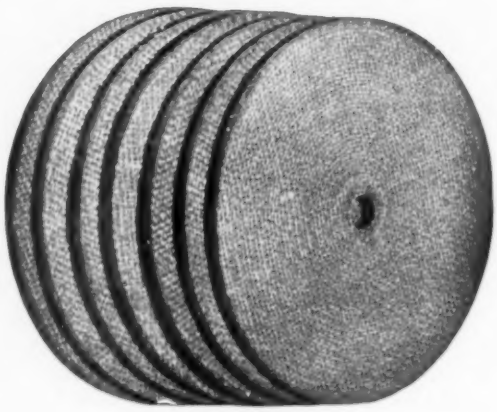

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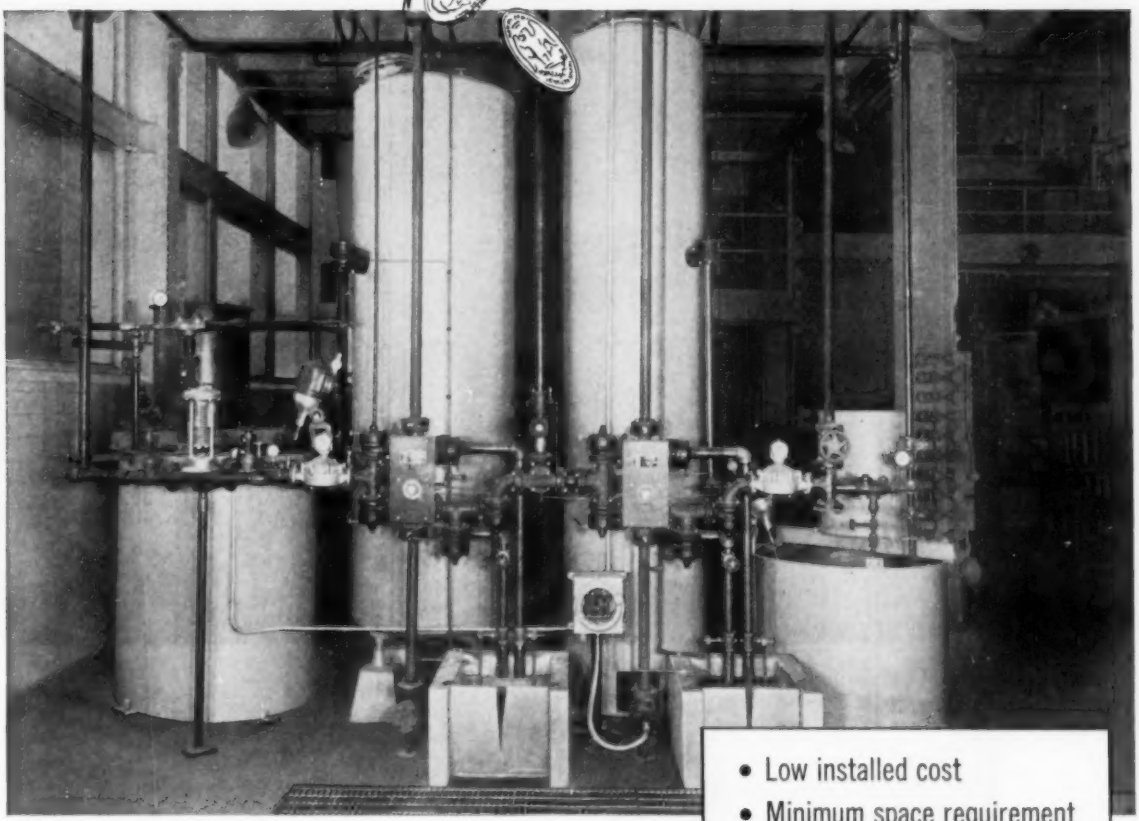

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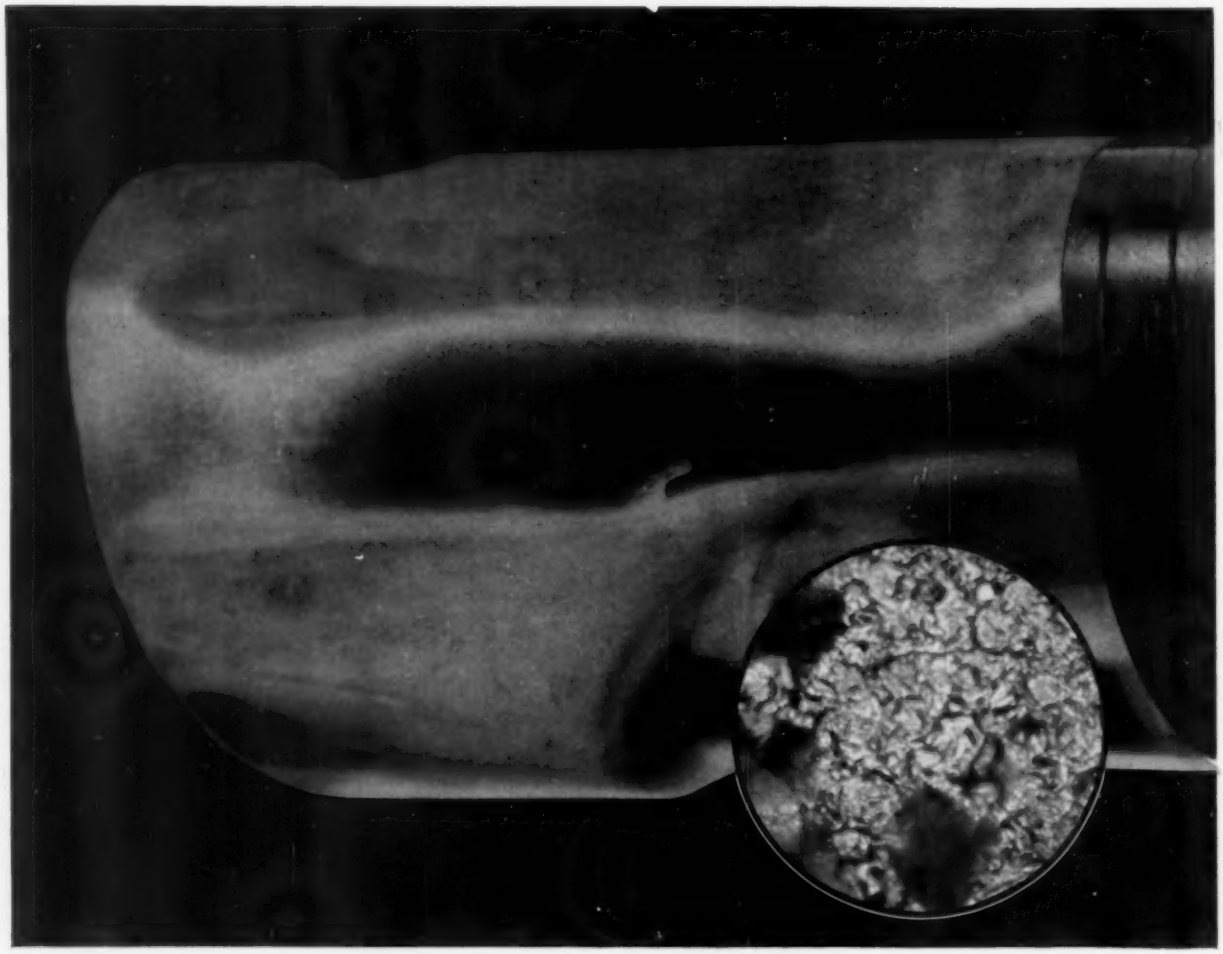
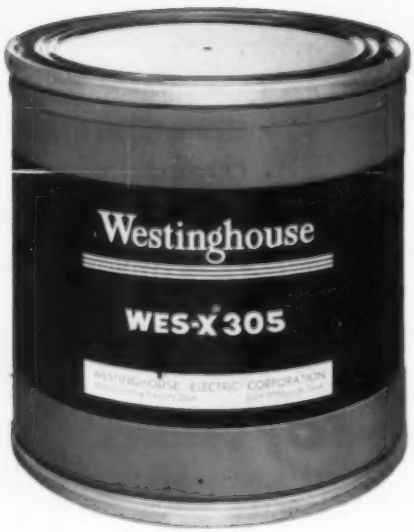
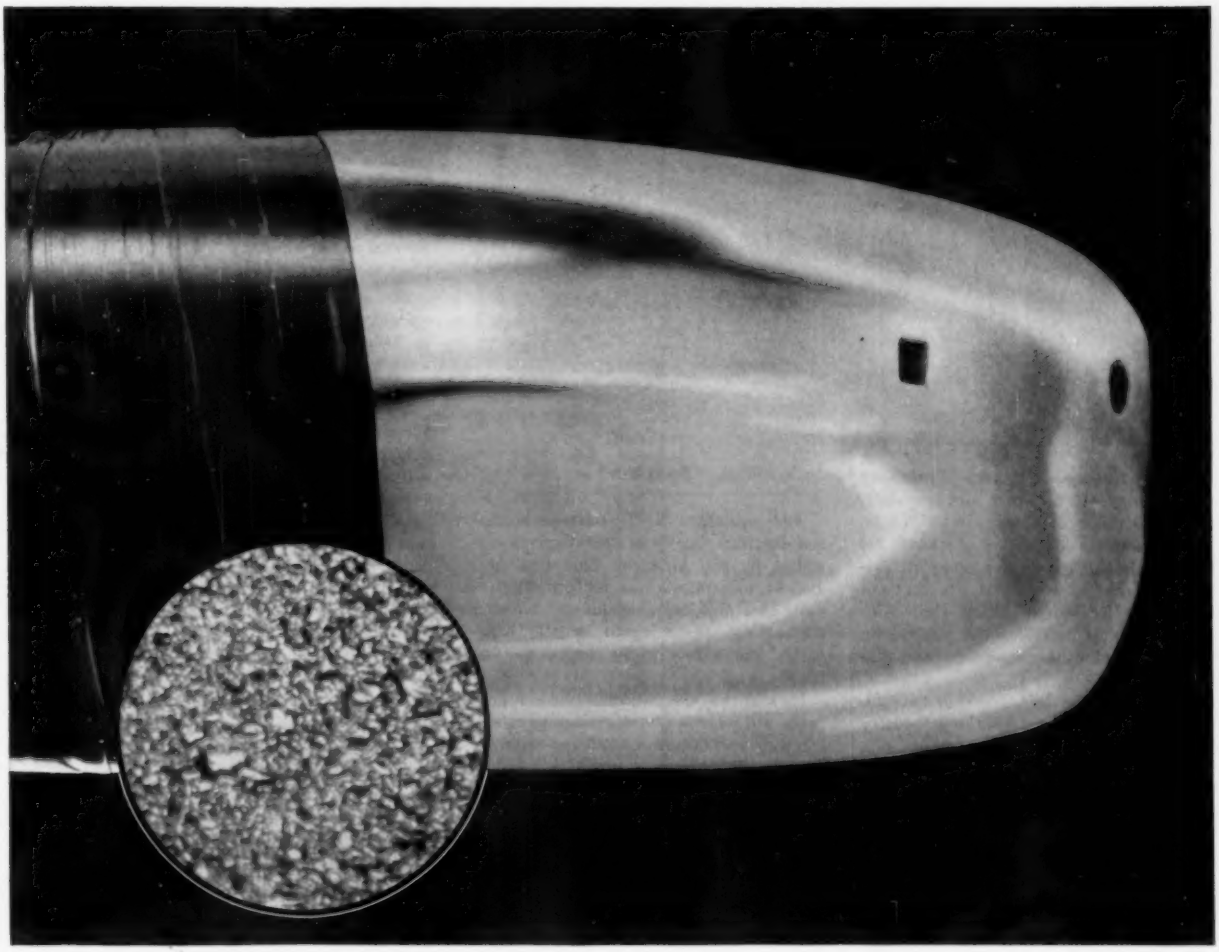




You can speed up

Wes-X 305 makes the difference. The two ends of this automobile bumper part were plated by the acid copper process at the same current density (175 amperes per square foot). The section shown on the left was plated with the addition of a normal acid copper addition agent . . . note the burning and coarse grain on the ordinary plating . . . and the smooth, fine-grain, burn-free, uniform deposit on the Wes-X 305 section shown on the right.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 806.



plating and maintain quality, too

. . . with Wes-X® 305 acid copper additive

A production bottleneck can be broken in many instances by simply speeding up plating operations. However, plating speed-up normally results in burned and coarse-grained deposits not tolerable for decorative finishes.

Now, as the illustration shows, speed-up *is* possible, without quality loss, by use of Wes-X 305 additive. Maximum allowable current density is 25% to 50% greater — 50 to 100 amperes per square foot.

Wes-X 305 solutions are easy to control. Wetting agents are not necessary. Quality of finish is not affected by changes in concentration of solution constituents. Chlorides present no problem.

For more details about Wes-X 305, and its companion additives for other plating advantages, call your Westinghouse sales engineer — or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-10452

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INDUSTRY NEWS

Banel Lab

New, Enlarged Barrel Finishing Laboratory—R. C. Trow, vice-president, Almco Division of Queen Stove Works, Inc., announces completion of what is believed to be the world's most complete barrel finishing research and development laboratory located at Albert Lea, Minnesota, headquarters for the Supersheen line of barrel finishing equipment and supplies.

Purpose of the laboratory is twofold. First, it offers the metalworking industry the most modern facility for determining, without obligation, the most effective deburring and finishing methods for all types of parts. Sample processing of actual parts will be offered free of charge to manufacturers. Second, it provides the industry with latest machines and equipment for advancement of barrel finishing research.

This new Almco laboratory features three major types of barrel finishing machines. These types are: standard machines, "submerged" units, and fixture equipment of varied barrel diameters and lengths. The new Laboratory also includes a six-station Sub-O-Matic "Submerged" System.

This Sub-O-Matic System is the first automated barrel finishing system available for sample parts processing. Utilizing automatic cycling of submerged-type finishing barrels and tanks, it is similar to the Sub-O-Matic systems now being used by leading manufacturers for high production metal finishing requirements.

Methods and process engineers who visit the Almco lab can see their parts sample processed in the same type of equipment which would be applied to barrel finishing on a plant production basis. The most modern testing and examination instruments are available.

The new laboratory is the central facility for the Almco engineering organization which includes other barrel finishing laboratories and sales offices in Detroit, Los Angeles, Newark, New Haven, and Philadelphia. Recently, plans were completed for an Almco barrel finishing laboratory in London, England.

AZI Appoints BMI—Battelle Memorial Institute has been recently commissioned by the American Zinc Institute, Inc. to undertake a research project covering new and improved finishes for zinc die castings, according to John L. Kimberley, executive vice-president of the Institute.

He said that the projected research program will include investigations to establish ways and means of anodizing and dyeing zinc die castings as well as a program aimed at improvement and economy in current plating and other finishing operations.

According to Kimberley the new project will be directly supervised by an AZI committee to include E. A. Anderson of The New Jersey Zinc Company of Pennsylvania, A. A. Smith of American Smelting & Refining Company and R. C. Bell of Consolidated Mining & Smelting Company of Canada, Ltd. Advisers will include M. R. Caldwell of Doehler-Jarvis Division of National Lead Company and M. Diggin of Hanson-Van Winkle-Munning Company.

To Serve Customers Better—A series of regional meetings, held in New York, Cleveland, Chicago, Detroit, and Los Angeles, has given Parker Rust Proof Company representatives an insight into expected developments in surface treatments for metals in the immediate future.

Home office personnel at the meetings included M. B. Roosa, vice-president in charge of sales; E. B. Thompson, assistant sales manager; R. I. Peterson, service manager; Ross Perry, manager, cold forming division, and John W. Helms, advertising and public relations manager.

Primarily, the meetings were designed to help Parker technical representatives serve their customers better. Trends in business and manufacturing, and developments in many fields were covered, with special attention on the new Parker products which are contributing to these developments.

Awarded AF Contract—A substantial Air Force Development contract in the guided missile field has been awarded Acoustica Associates, Inc., Glenwood Landing, L. I., New York. According to Robert L. Rod, president of the firm specializing in design and manufacture of ultrasonic cleaning, processing and measuring equipment, award of this Air Force contract will result in a considerable expansion of the company's engineering and plant facilities.

The awarding of this Air Force contract coincides with the company's delivery to an Atomic Energy Commission facility of what is believed to be the world's largest single installation of ultrasonic cleaning equipment. At the same time, Acoustica is readying for delivery to the U.S. Navy a large, heavy duty ultrasonic cleaning system, which will be used to evaluate the need for additional units of this type at naval yards throughout the world. It is expected that this equipment will simplify maintenance problems encountered when servicing and reclaiming precision parts used in naval instruments and similar intricate apparatus.

Machine Tool Company Moves—Frank B. Stallings of Cleveland, Ohio, announces acquisition of the machine tool and pedestal grinder product lines of the Bradford Machine Tool Company, a 115 year old machine tool building firm of Cincinnati. Stallings also stated that he had purchased part of the manufacturing facilities of this precision plant which would be moved to Lansing, Michigan, to become another 'Universal' affiliate. Various Bradford personnel are being moved to Lansing from Cincinnati.

A new company has been formed—The Bradford Machine Tool Company of Michigan, and this company will continue to manufacture the precision, 12, 14, and 16 inch Engine and Toolroom Lathes and Pedestal Grinders of from 1 to 30 horsepower that have made the name Bradford well known over the past century. R. B. McDowell of East Lansing is vice-president of the new firm and will actively manage this affiliate.

Radebaugh Award—Charles R. Griffith, waste engineer for the Fort Wayne Division of Dana Corporation, has been named 1956 winner of the Radebaugh Award by the Central States Sewage and Industrial Wastes Association. He earned the Award as the result of a paper titled "Lagooning of Industrial Wastes at Dana Corporation, Fort Wayne, Ind."

Griffith has been with Dana's Fort Wayne Division since 1948. In that year, working with the plant engineer, he undertook a study of the industrial waste problem that led to the development of a novel system of treating wastes. Success of the system was the subject of the paper that won him the Radebaugh Award.

INDUSTRY NEWS BRIEFS

● **Haveg Industries, Inc.,** is now manufacturing what is believed to be the world's largest pressure moldings. They are now being produced at the Wilmington, Delaware plant.

● The **Army Engineers** are accepting applications for the position of superintendent of a Nuclear Power Package Reactor, an experimental plant under construction at the Engineer Research and Development Laboratories, Fort Belvoir, Va. The job will pay $8990 a year. Minimum requirements are a Bachelor of Science Degree in Mechanical or Electrical Engineering and ten years of progressive experience in one of these fields. Preference will be given to applicants with five or more years experience in supervising the operation of steam plants generating electricity.

● The most advanced electronic theories and products of interest in the steel industry will be presented at the 1956 Western Electronic Show and Convention in Los Angeles, August 21–24.

● Ground-breaking ceremonies were held recently at the plantsite of **American Brass Company's** integrated aluminum mill at Terre Haute, Ind. The American Brass Company, with general headquarters in Waterbury, Conn., is a wholly-owned subsidiary of **The Anaconda Company.** James F. Ackerman will be in charge of the new facility.

● **West End Chemical Company** and **Stauffer Chemical Company** announce that their boards of directors have met and both boards have approved a plan of merger of West End into Stauffer. It is expected that the formal merger agreement will be adopted by both boards in the near future and will be submitted to the stockholders of both companies for approval.

● Effective immediately, **Carboloy Department of General Electric Company** will be known as the Metallurgical Products Department, to reflect the company's greater emphasis on specialty metals development and manufacture. Department headquarters will remain in Detroit.

● **Heppenstall Company,** Pittsburgh, has used its nearly 30 years of experience in producing electric induction alloy steel to create a new chromium-molybdenum-vanadium die steel called Moldtem, which it is now marketing in blocks and bars for plastic molds and zinc die casting dies.

● A major sales effort in the atomic energy field is shaping up with contracts in for 50 per cent of the available space in the **1956 Trade Fair of the Atomic Industry,** as reported by the **Atomic Industrial Forum,** sponsors of the exhibit. The Fair is scheduled for September 24–28 at Navy Pier, Chicago. In conjunction with the annual Forum conference on "management and technology for the atomic industry," Morrison Hotel, September 25–27.

● Dr. William Shockley, Director of the **Shockley Semiconductor Laboratory of Beckman Instruments, Inc.,** received additional honors at the June commencement ceremonies at Rutgers University when he was awarded the honorary degree of Doctor of Science. Last year Dr. Shockley was similarly honored by the University of Pennsylvania.

Barrel Nickel Plating Troubles

●

Maybe you're not interested in chromium plating on your barrel nickel plate. Still the results of chromium plating are interesting since they furnish a clue to good nickel plating. Just as back in 1928 poor cleaning and poor nickel plate was brought to attention by the then new process of chromium plating so barrel chromium shows up weakness in the barrel nickel plating. True Brite has worked with barrel chromium vendors and can supply the information to give you nickel plate you can depend on.

●

The same factors that give good barrel nickel plate give good nickel for barrel chromium. The solution should be free from foreign metals. Copper is especially troublesome and must be dummy plated to remove. While iron is not too troublesome because it precipitates at the high *p*H used, some does stay in solution. Large amounts cause brittleness and loss of brightness necessitating large additions of brighteners to maintain brightness.

●

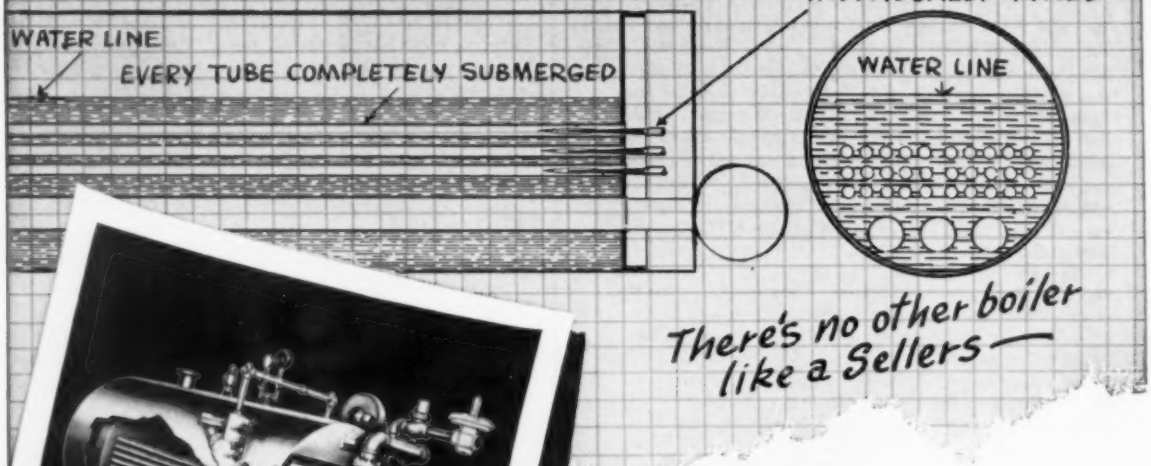
Iron forms an olive to reddish sludge in the tank and whenever any considerable amount of it is present the solution should be filtered. A convenient method is to put a filter on the tank one day a week recirculating the solution. The filter should have a filtering capacity of about the capacity of the tank per hour.

●

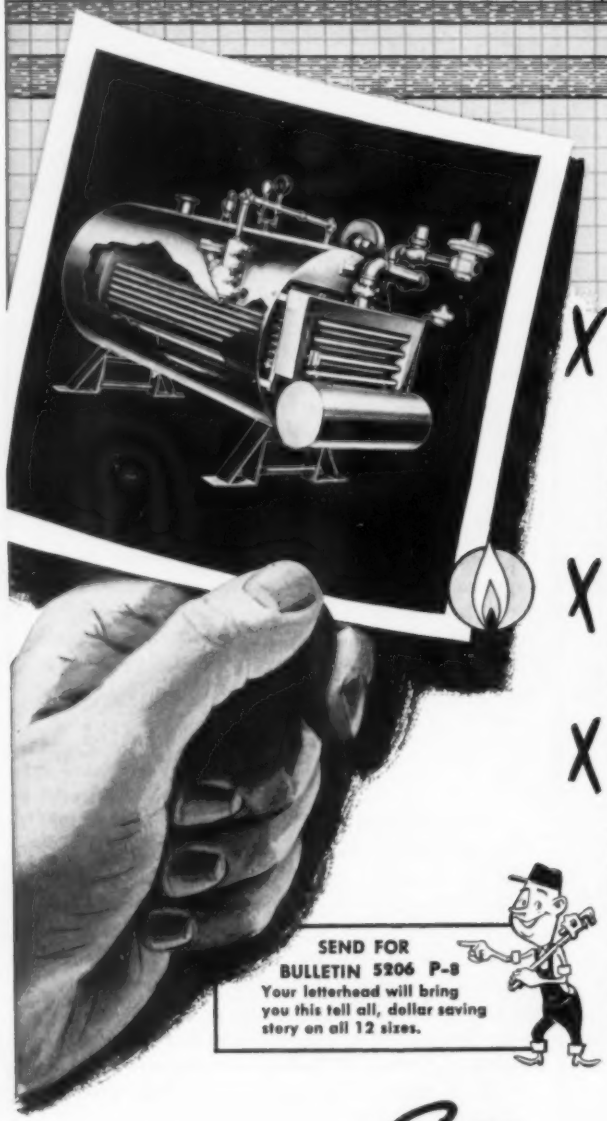
Most complaints of high brightener consumption are due to impure solutions so that taking care of the solutions will pay its way in keeping cost of operation down. Barrel nickel plating as a process has been improved more in the last ten years than in the previous fifty. True Brite Chemical Products have been pioneers in this improvement and offer more for your money than ever before. Why not join the band wagon of industry leaders who use our materials? Distributors have stocks near you for your prompt service.

TRUE BRITE CHEMICAL PRODUCTS CO.
P. O. Box 31 OAKVILLE, CONN.

when you buy a steam boiler . . . be sure to look at the picture of a Sellers Immersion Boiler



There's no other boiler like a Sellers—



every square foot of heating surface is water backed— —100% effective!

The long, individually gas fired tubes in the Sellers Immersion Boiler are all completely submerged nearer the water level—and over the return tubes! Heat is therefore uniformly distributed through them—and directly into the water—no where else!

there's no scale problem!

In immersion heating, the needed long tubes expand and contract sufficiently on intermittent firing to crack loose any hard scale that forms on the tubes. This practically eliminates the scale problem, makes maintenance simpler and increases the boiler's efficiency.

the average flue gas travel is 15 feet!

Maximum, almost complete utilization of the exhaust heat is assured with a Sellers Immersion Boiler. This is a result of Sellers exclusive design—with the firing tubes completely submerged and *located over the return tubes,* there is a long, slow flue gas travel—an average of 15 feet! Heat can only go into the water.

There's no other steam boiler like a Sellers Immersion Steam Boiler. Its simple design gives you a package boiler unit with many other outstanding features. Minimum maintenance and maximum efficiency combine to give you years of remarkably low operating costs. Twelve sizes available!

SEND FOR BULLETIN 5206 P-8
Your letterhead will bring you this tell all, dollar saving story on all 12 sizes.

Sellers ENGINEERING CO.

4876 N. CLARK STREET CHICAGO, ILL.

Blast Heaters • Immersion Automatic Water Heaters • Combustion Units • Industrial Gas Burners
Vertical Steam Boilers • Immersion Tank Heaters • Gas Combustion Equipment

Photo courtesy Mitchell-Bate Co., Waterbury, Conn.

What's being lowered here?

Costs! With Unichrome Coating 218X, of course!

SAVINGS START soon as users lower racks and baskets into Coating 218X. This approved vinyl plastisol provides insulation that lasts phenomenally long. It withstands toughest plating and cleaning cycles, even vapor degreasing cycles. It won't chip, tear, blister . . . won't contaminate baths. Coast to coast, platers know how it cuts maintenance to the bone, saves most time and money in the end.

If you want a nearby, experienced firm specializing in plastisol application to do the job for you, we'll gladly supply names.

PLATING MATERIALS
ORGANIC COATINGS
TIN & TIN CHEMICALS
CERAMIC MATERIALS
RADIOGRAPHIC EQUIPMENT
WELDING SUPPLIES
METALS & ALLOYS
HEAVY MELTING SCRAP

UNICHROME 68

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY

Atlanta • Pittsburgh • Detroit • E. Chicago • Los Angeles

In Canada: Metal & Thermit-United Chromium of Canada, Limited, Toronto.

PERSONALS

Bartlett

Anderson

Reinecker

Duryea

Spring

Bartholomew

Edstrom

Rigdon

Norman E. Bartholomew, formerly sales supervisor in Detroit for Kelite Corp., has been promoted to district sales manager of the Detroit district.

Dr. Samuel Spring has been appointed laboratory director of Kelite Corporation.

Stanford J. Barlett has been appointed manager, Washer Div. Barlett's responsibilities will include complete supervision in sales, design and manufacturing metal parts washers and dryers or complete finishing systems.

Paul F. Anderson, Cranford, N. J., has recently joined Circo Equipment Co. as purchasing agent. Anderson is responsible for purchasing all equipment, supplies and services.

Richard H. Kline has been added to the Pennsylvania Salt Manufacturing Company's Metal Processing Department sales staff in Detroit.

Following technical training at the company's Whitemarsh Research Laboratories, Kline will work under the direction of district sales manager **Charles R. Sorber,** handling Pennsalt products for the metal producing and metal working industries in the Detroit area.

A. James Fisher has been appointed general sales manager of Metal & Thermit Corporation. In his new post, Fisher will supervise sales of all metal & Thermit products.

Kenneth Edstrom has been appointed district manager of Wagner Brothers, Inc. new Cincinnati Branch, covering Southern Ohio, Kentucky, Tennessee, Virginia and West Virginia.

Walter J. Reinecker has been appointed chief engineer, Sonic Div. He will be responsible for proceeding with further developmental work along ultrasonic lines already established by Circo.

Charles G. Rigdon has been appointed to the newly created post as barrel finishing engineer for Frederic B. Stevens, Inc., Detroit, Mich.

L. N. Duryea has been appointed resident counsel and assistant secretary of Beckman Instruments, Inc. Duryea's duties will relate chiefly to legal and patent matters of a corporate nature.

Arthur Leaver has been appointed sales engineer of the Chicago area and eastern Missouri territory, including St. Louis by the Abrasives Div. of Elgin National Watch Co.

John Wiziarde has been assigned to handle the Ohio sales territory.

Also announced was the appointment of **Douglas Graham** as product manager of the company's Abrasives Div.

William A. Homer has been appointed district manager in charge of Graver Water Conditioning Co.'s new sales-service office in Boston, Mass., to service the New England area.

James H. Ewing has been elected vice-president of the Andrews-Knapp Construction Co., Inc., a subsidiary of Knapp Mills, Inc., New York. Ewing was formerly manager of the Specialties Division of Knapp Mills. His new duties will be centered in sales and administration of the construction company.

Appointment of **Charles D. Branson** as assistant director of research of Robertshaw-Fulton Controls Company has been announced by **Victor Weber,** vice president and director of research.

He will make his office at the company's eastern research facility, Robertshaw Research Center at Irwin, Pa. Last year, more than $2.3-million was spent on research and development projects by the company.

Branson has been with the organization for more than 20 years. Formerly, he was chief engineer at the company's Fulton Sylphon Division, Knoxville, Tenn. He has also held the positions of assistant chief engineer, development engineer and laboratory assistant, and for a time was engaged in production and inspection work.

Howard L. Cromwell has been appointed Plant Manager of Stauffer Chemical Company's Freeport, Texas, operations, according to an announcement issued by **Daniel J. Keating,** Vice President and General Manager, Agricultural Chemicals Division, Stauffer Chemical Co.

Cromwell, who is a graduate in chemical engineering from the University of Maryland, joined Stauffer in 1947 and rose to Manager of Stauffer's Harvey, Louisiana, plant. More recently, he has been engaged in process development work at the company's Niagara Falls plant.

Robert J. Racine has been appointed Western Regional Sales Manager for Kelite Corporation, manufacturers of Industrial Chemicals and Steam Cleaning Equipment.

Racine

Racine was formerly associated with Wyandotte Chemicals Corporation as Manager of Industrial Sales. Racine's background includes field sales experience and technical service in the metal industries.

Racine is active in the AES, of which he has been Secretary-Treasurer and First Vice-President of the Detroit Branch. He is also a member of the American Society for Testing Materials, and the American Ordnance Association.

FOR PRECISION STOPS . . .

IN SELECTIVE PLATING . . .

MICCROSTOP

. . is designed to achieve an accurate line of demarcation in all plating cycles. It will go through cleaners and hot solutions without losing its exceptional adhesion, unsurpassed on sharp edges. The finest all purpose stop-off lacquer on the market today.

MICCROMASK

. . is specifically designed for maximum adhesion in hard chrome plating. It will hold to a fine line and may be easily removed after plating. Dries rapidly. Multiple coats will take any long cycle without treeing.

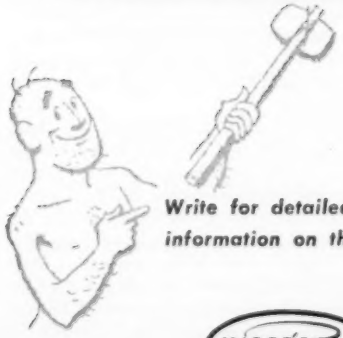
Note: Both MICCROSTOP and MICCROMASK may be removed easily in MICCROSTRIP A.

MICCROWAX

. . . C-562 is the outstanding product for the most efficient method of selective hard chrome plating. Melting at 180°F, it is especially applicable for flat surfaces and sharp edges, where dipping is feasible.

. . . C-600 will take all plating cycles without losing adhesion. Melting at 300°F, it is not affected by temperatures, acids, or caustics used in any plating operation.

Both MICCROWAX C-562 and C-600 may be reused. Only one dip tank is required. Both harden immediately, cutting down application time to a minimum.



Write for detailed bulletins giving full information on the above products.

MICCRO Products

MICHIGAN CHROME
and Chemical Company
8615 Grinnell Avenue • Detroit 13, Michigan

Cerate Cooler

Metal Preparations

L—800. Cooling Cutting Wax—The Johnson's Wax Company has announced the release of a new booklet entitled "Cutting and Grinding with Johnson's Wax Cutting Fluids."

This booklet describes the properties of wax as they assist the cutting functions of the metalworking industry. It tells how wax lowers cutting temperatures and greatly increases tool life. In addition the booklet contains a comparative machinability table as a guide to selecting the correct coolant for every grade of metal.

L—801. Aluminized Wire—A colorful 6-page flyer, Bulletin DH-537, has been released by the Page Steel & Wire Rope Division, American Chain & Cable Company, Inc. It describes ACCO Aluminized products, wires that have the strength of steel and the corrosion resistance of aluminum.

Applications of this highly ductile wire, whose coatings withstand forming operations and the one-diameter wrapping test without fracture include: chain link fencing and barbed wire; ASCR core wire; strands for ground, guy and messenger wires; telephone wire; tie wire; and lashing wire are detailed. Physical characteristics and miscellaneous applications involving corrosion and corrosion coupled with high operating temperatures are also discussed.

L—802. Electronic Relay—Data sheet describes new electronic relay designed to be safe for water-bath operation. Four-way panel switching, "fail-safe" operation, and d-c circuit are discussed.

L—803. Tele-Thermometers—Data sheet describes new twelve-channel dial thermometer with flashlight battery powered circuit and thermistor probes. New interchangeable probe types are listed, also six-channel and single-channel models.

L—804. Paint Preparation—How to prepare metals for painting is the subject of a new, well illustrated folder issued by Wyandotte Chemicals Corp. In addition to describing the use of Wyandotte Pre-Fos, this folder, F-2374, also gives information on paint strippers, rust removers, metal conditioners and metal cleaners—both alkaline and emulsion.

A photographic case history describes the ability of Pre-Fos to clean and phosphate in one operation to give exceptional paint adhesion and to give low use-cost.

L—805. Dust Collector—The new Ventrijet made by the Pangborn Corporation for the wet collection of industrial dusts is illustrated and described in a new 8-page brochure (Bulletin No. 920).

Fifteen photographs and drawings show the unique action of the Ventrijet. Dimensions, weights and capacities are presented in three tables.

In the Ventrijet, utilizing the venturi tube principle, water is broken into fine particles and mixed with dust-laden air without mechanical means in one or more venturi tubes. Dust entrapped in the water particles settles to the bottom of a tank built integrally with the collector for automatic, mechanical removal.

L—806. Drafting—A 56-page booklet on standard and simplified drafting practices is being offered free by American Machine & Foundry Co. The first section of this 8½ x 11-inch publication contains a speech on this provocative subject as given by Jay H. Bergen, AMF Standards administrator, before the American Society for Engineering Education. The remaining 44 pages are devoted to the details of AMF standards on Drafting Room Practice and Simplified Drafting.

L—807. Tools in a New Field—"Freeze-Drying Equipment for Laboratories" is the subject of a new 36-page catalog just published by Arthur S. LaPine & Co. The catalog includes descriptions of new freeze-drying units, vacuum gauges and pumps, bath coolers, refrigerated centrifuges, and related laboratory and small-scale production equipment.

L—808. Thermostats—A convenient catalog for designers and engineers who are especially interested in miniaturized thermostats and surface-mounted thermostats has been prepared by Fenwal Inc., manufacturer of precision temperature controls.

The 4-page 2-color catalog (MC-124A) presents in lucid, easily-read form all the physical, electrical and performance data required for specifying several popular types of Thermoswitch controls. These include cigarette-sized thermostats, button-sized thermostats, and a series of surface-mounted controls available either with or without a flexible plastic enclosure for special alkali or acid service.

L—809. Roof Ventilators—A revised catalog, Bulletin A-112A, covering their line of roof ventilators has been published by the Hartzell Propeller Fan Co.

The catalog contains complete information on the revolutionary Reversible Roof Ventilator as well as the Penthouse, Vertijet, Airjet and Rotary Roof Ventilators. Sizes, specifications, performance data, and dimensional drawings are shown.

L—810. New Work-Clothing—A completely new, competitively-priced line of industrial work-clothing has just been introduced by Chem-Wear, Inc., manufacturers of acid- and caustic-resistant work-shirts, pants and coveralls. The entire line is described in a booklet recently published by the company. These clothes are described as being "porous, acid and caustic resistant and reducing static."

L—811. Thickness Tester—The Kocour Co. has available a limited quantity of a new publication called "Questions and Answers" describing the Kocour Electronic Thickness Tester.

L—812. Filtration—Graver Water Conditioning Co. now has available copies of Bulletin WC-107A, Water Filters, Pressure Type.

This 12-page, fully illustrated bulletin completely describes the uses, design features and engineering details of pressure sand and gravel filters.

Details of all accessory equipment, the different types of controls available and a detailed table giving capacities, sizes and space requirements are included. Cutaway views of both horizontal and vertical filters are shown as well as details of strainers, distributor systems and piping arrangements.

Tapes that keep plating where you want it!

For clean, positive stop-off masking—regardless of plating solution or surface—you can depend on one of these "Scotch" Brand Tapes for electroplating to do the job...easily, economically: No. 470—a strong, conformable, "all-around" tape that is highly resistant to cleaning and plating cycles. No. 850 Polyester Film Tape—thin and tough; transparent backing; excellent for flat or simple curved surfaces. No. 420 Lead Foil Tape—for use where a "thieving" action is desired. For complete information, ask your "Scotch" Brand Tape distributor, or write 3M Co., Dept. LF-86.

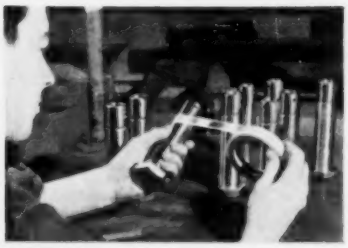
Always specify "Scotch" Brand, the *quality* tape . . . and stick with it!

TAPES FOR ELECTROPLATING . . . *three of more than 300 pressure-sensitive tapes for industry, trademarked . . .*

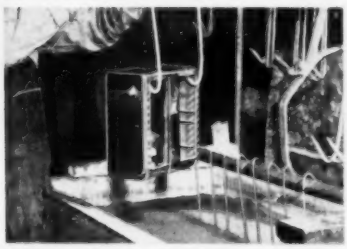
REG. U.S. PAT. OFF.

SCOTCH BRAND

Look what you can do with them!



THREADED shaft is masked with "Scotch" Brand No. 850 Tape. High clarity of tape's polyester backing permits continuous inspection for any "creeping under" action.



CLEANING racks can be protected by binding them with "Scotch" Brand Tape No. 470. Heavy-duty vinyl backing withstands acids, alkalies, salt water, alcohol, hydrocarbons.

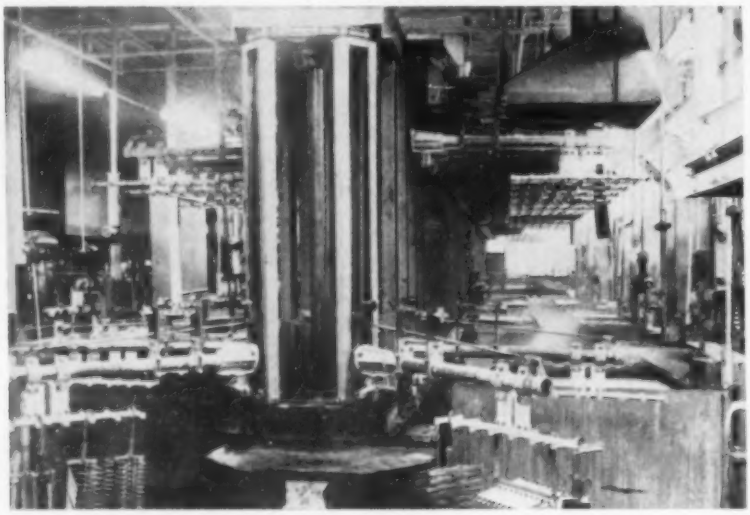
LARGE metal castings can be masked with "Scotch" Brand Tape No. 470 when cleaning or plating. Even on rough surface, tape's adhesive will hold during entire operation.

PROPELLER shaft is quickly and easily masked with No. 420 Tape before critical plating operation. "Thieving" action of lead foil backing successfully reduces edge build-up.

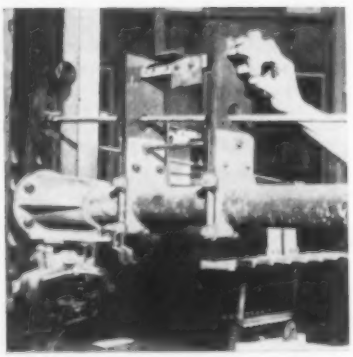
The term "Scotch" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

3M COMPANY

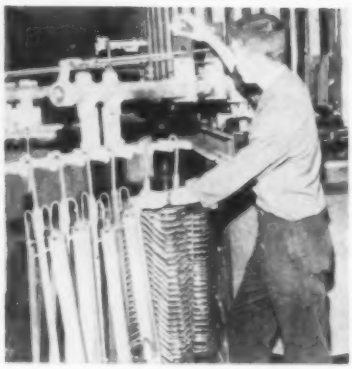
Equipment and Supplies



General View of a Bypass



Dial Control



Setting the Cycle

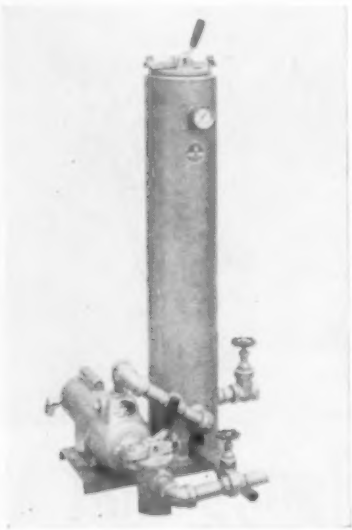
E—813. Selective Bypass Mechanism—A new bypass mechanism automatically controls as many as nine or more complete metal finishing processes on a single anodizing or electroplating machine, according to an announcement from its manufacturer, Hanson-Van Winkle-Munning Co.

The new mechanism is a part of H-VW-M's new "Dial-A-Cycle" system for automatic metal finishing. This system is controlled from a dial on the carrier arm that moves parts through processing tanks. As unfinished parts are loaded on the carrier, the machine operator sets the dial for the processing steps through which the load is to move. Automatic conveying does the rest, lowering parts into the prescribed tanks, bypassing others, according to the dial setting.

Heart of the system is a series of limit switches and solenoid-operated setdown flippers that control the action of the carrier. Different dial settings change the position of a flag which subsequently moves a contact flag into one of several positions, in which it contacts or bypasses flippers and switches at each tank.

No further manual operation is necessary until finished parts are unloaded. With bypass features of the Dial-A-Cycle system plus timing and process control features of the H-VW-M machine, an almost infinite combination of sequences and dwell periods for cleaning, rinsing, etching, anodizing, plating, coloring and sealing can be achieved.

E—814. Pure Water for Plating Baths—Pitting and spotting, with consequent high ratio of rejects, may be caused by impurities in the water supply for the plating bath. Low cost protection against this common problem is offered by Paddock Pool Equipment Company of Van Nuys, Cal.



Diatomaceous Filter

Where pure water is vital, Paddock's new line of diatomaceous earth filters completely removes all suspended matter at flow rates up to 1800 gallons per hour. A measure of this new "DS" type filter's effectiveness is indicated by the fact that the diatomaceous earth on the filter element presents approximately 2,500,000 filter openings per square inch. Even the smallest particles of solid matter cannot pass through.

Paddock's filter element is a single spiral of non-ferrous metal, fitted on the exterior surface with orlon filter cloth. Diatomaceous earth adheres to the entire surface of the cloth and provides super-fine filtering. No backwashing is required to clean this filter. Simply remove the quick-opening lid and hose off the filter element.

Standard models occupy about 2x2 feet of floor space and come with 6 or 10 square feet of filter surface. Other sizes and stainless steel models are available on order.

contacts or passes switches and flippers at each tank in the metal finishing sequence.

Advantages cited for the new system by initial users include: 1) cost reduction, since a Dial-A-Cycle system on one machine can do the same metal-finishing job formerly done by as many as nine machines; 2) reduction of labor costs; 3) improved quality, due to close, automatic control of transfer and immersion periods; and 4) reduction of maintenance costs. Dial-A-Cycle can be used at any metal finishing installation for anodizing, electroplating or similar processing, and is particularly valuable when a variety of parts requires different processes or colors, H-VW-M reports.

The Dial-A-Cycle control mechanism, located at the back of each carrier arm, is set after parts have been loaded at the machine's load-unload station. The operator rotates the dial to the setting prescribed for the raw parts just loaded. This

Special Reports On Finishing Non-Ferrous Metals

NUMBER II—Paint Base, Corrosion-Resistant Finishing with Iridite

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

Chromate conversion coatings are well known and accepted throughout industry as an economical means of providing corrosion protection, a good paint base and decorative finishes for non-ferrous metals. However, continued developments have been so rapid and widespread that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this digest of current information; to bring you up to date on the many ways in which you can obtain proper surface preparation for painting and increase product durability with a single multi-purpose chemical pretreatment. Report I on decorative, corrosion-resistant finishes and Report III on chemically polished, corrosion-resistant finishes are available on request.

First, it is an accepted fact that metal surfaces should be prepared before painting to make possible an efficient paint system. Naturally, this preparation should provide for good initial paint adhesion. Chemical treatments have proved extremely effective in this respect, particularly those of a neutral or preferably acid nature. Further, to be most efficient, chemical treatments should provide a non-porous barrier to maintain adhesion by sealing the metal from the paint and moisture. They should also provide a self-healing film which prevents lateral corrosion in the event that bare metal is exposed through scratching.

The Iridite chromate conversion coatings meet all these requirements. Iridite is a chemical conversion treatment for surface preparation. It provides initial paint bonding by molecular adhesion. It is acid in nature and produces a film that is gel-like and non-porous in structure. Thus, the Iridite film effectively seals the metal from the paint and from moisture penetration. Because the film contains certain relatively soluble constituents, it will protect areas scratched through to bare metal and prevent lateral corrosion. This is accomplished by a gradual leaching of these constituents into the damaged area.

Further, because of its gel-like, non-crystalline nature, the Iridite film will not affect the appearance or texture of the paint film, nor will it dust or powder to mar the painted surface. Because the film is non-porous, paint coverage is increased, thus substantial savings in paint costs will be realized. In addition, treated parts may be stored for long periods of time prior to painting without the risk of entrapped moisture causing blistering when painting.

Iridite chromate conversion coatings are widely used with equal ease and success under both baked and air-dried paint systems. While the actual adherence properties of the Iridite film do not increase appreciably with its thickness, corrosion protection does. The protection of the Iridite film is proportionate to its thickness and should be taken into consideration when selecting the Iridite to meet your needs. However, it is sometimes necessary to sacrifice maximum corrosion protection for appearance when a finished part is to be only partially painted. For example, it may be desirable to use a thin, clear, bright Iridite film if the unpainted areas must present a chrome-like appearance. A typical case is that of instrument housings on which the exterior is painted and the inside left unpainted.

On the other hand, if all surfaces of the product are to be painted and maximum corrosion protection is required, the heavier and most protective Iridite films should be used. For example, all surfaces of zinc die cast fruit juicers are finished with a highly protective Iridite film prior to painting to provide maximum resistance to the corrosive action of fruit juices.

Iridite finishes are now available for all commercial forms of the more commonly used non-ferrous metals, including zinc, cadmium, aluminum, magnesium, silver, copper, brass and bronze. In addition to providing an excellent base for paint, the Iridite films also have high decorative value when used as final finishes in themselves.

These films can produce a wide variety of pleasing appearances including clear bright, iridescent yellow, bronze, olive drab and brown. In addition, many films can be modified by bleaching or by dyeing. Among the dye colors available are various shades of red, yellow, green, blue or black.

In planning or designing, you should consider the many other characteristics of Iridite finishes which may enter into the specific problem. In addition to their functions as protective and decorative finishes, and as bases for organic finishes and bonding compounds, Iridites have low electrical resistance. Some can be soldered and welded. The film does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product requires the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.

EQUIPMENT & SUPPLIES

E—815. New, Improved Filtration Unit—The Industrial Filtration Division of the U.S. Hoffman Machinery Corporation has announced the complete re-design of their "Vacu-Matic" filtration unit. This new and improved unit is now known as the Hoffman "Vac-40 Vacumatic" Filter.

Completely automatic and self-cleaning, the Hoffman "Vac-40" is designed for use on grinders, hones and other machine tools where continuous and effective filtration of coolants is desired. It employs vacuum rather than gravity and is capable of delivering extremely high flow rates in sustained operation.

Using a specially-fabricated paper as its filtration medium, the "Vac-40" delivers dry sludge with no coolant carry-over, thus minimizing coolant loss. The newly re-designed unit is compactly constructed so that it will easily fit into the space normally required by a sump tank. The paper filter medium is supported by an endless fabric belt which in turn, is carried on a wire mesh belt which revolves continuously on a chain-sprocket drive. A large vacuum chamber is located directly beneath this belt, and the vacuum tends to hold the paper tightly against the supporting screen.

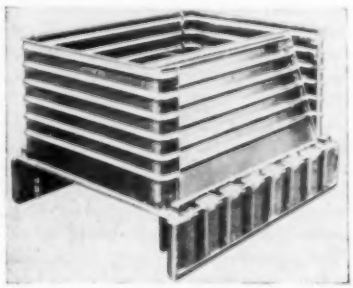
Dirty coolant flows by gravity from a baffled distributor on to the filter paper directly over the vacuum chamber. Coolant is uniformly distributed over the entire width of the paper surface. Owing to pressure differential created by the powerful vacuum, the coolant is filtered rapidly through the paper into the vacuum chamber. The clean coolant drains into the clean coolant sump, and is then delivered back to the machine tool by the supply pump. A liquid level sight glass is installed in the clean coolant sump so that the machine tool operator can instantly determine the coolant level.

E—816. Ducts—These ducts manufactured entirely of polyester glass reinforced plastic are light in weight, tough and of high strength. It is also claimed that

Plastic Made

they offer chemical resistance to acid and many other conditions superior to that of stainless steel. Cost is said to be substantially less. While a wide range of standard fittings and ducts round and rectangular in section are offered, any size and shape of duct hood or stack can be produced according to Haveg Industries, Inc.

E—817. Fold-Away Box—Eliminating up to 66 per cent of the space needed to store and ship empty boxes, a new fold-away materials handling box which can be reduced to 1/5 of its original size has been developed by the Pressed Steel Division of Republic Steel.



Collapses

Made of corrugated steel, the box has collapsible sides which are easily set up or folded down. The sides are locked by a pin and slide bolt arrangement, giving the box a rigidity which permits it to be used in the same way as a non-collapsible box. The unit can be tiered when loaded, unloaded or folded.

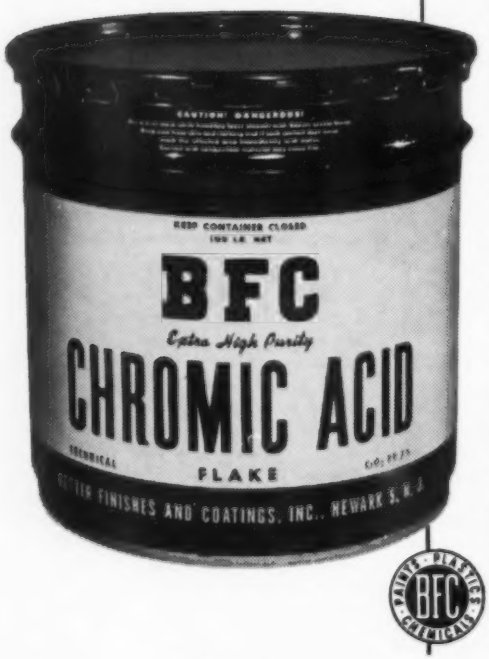
It has no removable parts.

extra high quality

CrO_3

Every batch checked!

99.75% pure



It's a fact. We check the purity of *every batch* of BFC Chromic Acid by our own special test in a plant lab located only a hop-skip-and-a-jump away from the flakers. Not a drum moves from plant to warehouse until the lab says, "OK".

We don't know any better way than 100% check-testing to keep our quality up . . . and complaints down. Do you?

BETTER FINISHES & COATINGS, INC.

268 Doremus Avenue, Newark 5, N. J.

2014 East 15th Street, Los Angeles 21, Calif.

How to get cost-saving answers to your *deburring and finishing problems*

Shown above is the main bay of the new Almco Supersheen Barrel Finishing Laboratory, which puts together under one roof the greatest array of machines and equipment ever assembled for sample processing of manufacturers' parts. It offers the broadest service available for the metal-working industry.

SEND YOUR PARTS FOR SAMPLE PROCESSING IN THE WORLD'S MOST COMPLETE BARREL FINISHING LABORATORY!

Wouldn't you like to achieve what so many other manufacturers have done . . . reduce deburring and finishing costs BY MORE THAN 90% as a result of detailed sample parts processing in The Almco Laboratory?

It's a practical way for you to find out, at no obligation whatsoever, what the most modern barrel finishing techniques can do to reduce costs and streamline production for you on operations such as descaling, deburring, grinding, burnishing, forming radii, obtaining ultra-low microinch surfaces, etc.

Almco has perfected notable advancements in barrel finishing, and the enlarged Laboratory features all of the latest Almco Supersheen barrels and equipment. Whether you have a small shop or a large department, you can be sure that sample processing of your parts will be done with production equipment similar to that which can reproduce the processes in your own plant. And your Almco report will be a down-to-earth factual analysis.

Why not take advantage of this popular Almco service? You may accomplish savings in time and labor never before possible, plus absolute uniformity in the quality of your parts.

An Almco Lab technician and a visiting finishing engineer examine a part during sample processing.

Final Almco report to the manufacturer is factual and complete in every detail.

WRITE TODAY Simply use your company letterhead, requesting an Almco Sales Engineer to call and make arrangements for sample processing. Or send sample parts along, with specification of results desired. (If possible, include finished part for guide.) Your Almco report, at no obligation, may show you the way to tremendous savings!

ALMCO

DIVISION OF QUEEN STOVE WORKS, INC.

68 Marshall Street • Albert Lea, Minnesota

Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England

EQUIPMENT & SUPPLIES

E—818. Surface-Active Agent—A new sulfonate-type surfactant with unusually high solubility, stability and surface activity in strong electrolyte solutions has been developed by The Dow Chemical Company to be marketed as Dowfax 2A1.

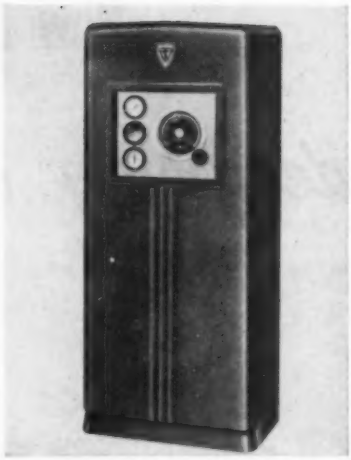
An anionic surfactant, it is especially effective in aqueous solutions of acids, alkalies and salts. Dowfax 2A1 is a moderate sudsing agent and is susceptible both to foam boosting and defoaming action. It has effective uses in metal cleaning and household and industrial hard surface cleaning as well as applications as a detergent or wetting agent in the textile, leather, petroleum, paper and food industries.

The first surfactant developed by Dow for use by industry, Dowfax 2A1 is a light-colored and free-flowing powder and has typically a 93 per cent active content by weight. Its color in a 10 per cent aqueous solution (Lovibond 5¼ inch column) is 63.2 yellow and 6.7 red.

Dowfax 2A1 can be used as a wetting agent in plating and electrolytic cleaning, various household cleansers, industrial detergents, drum and dairy cleaners and bottle washing formulations and cotton mercerization.

E—819. V-notch Chlorinators—The introduction of the first two models of the V-notch line of chlorinators has been announced by Wallace & Tiernan Incorporated. The V-notch chlorinators, built entirely with corrosion resistant materials, feature a new metering and controlling principle—the V-notch Variable-Orifice.

The chlorinators cover a feed range from 25 pounds per day to 2000 pounds per 24 hours. The Series A-712 Wide Range Model features direct reading dial indication of the feed rate with ± 4 per cent accuracy over a 20 to 1 range for any V-notch Variable-Orifice. The Series A-711 Chlorinator provides a rotameter for feed rate indication, giving accuracy over a 10 to 1 range for any one rotameter.



Wide Range Chlorinator

V-notch Variable-Orifice control gives precise and smooth chlorine feed control over an extremely wide range. The new chlorinators are styled with an attractive, two-tone green fiber glass cabinet.

E—820. Aerosol Spray Mist—A new push-button spray bomb that both treats burns and protects the skin with a cooling emollient film has been announced by the General Scientific Equipment Co., Philadelphia, Pa.

Called G-63 Burn Relief Spray, this new product contains analgesic agents to alleviate pain, and hexachlorophene to preclude possible secondary infection. It promotes rapid resorption of abnormal fluids in the afflicted area, resulting in reduction of painful swelling. The invisible area, resulting in reduction of painful swelling. The invisible film deposited by the spray isolates the burn and keeps skin moist and soft; it eliminates the need for bandages or dressings.

E—821. Cleaner—Northwest Chemical Company, Detroit, Mich., has developed an entirely new type of water soluble compound for effective precleaning of nonferrous metallic surfaces for plating and finishing operations.

The new compound 449 gives soak cleaning an entirely new aspect as a safe, efficient replacement for solvent cleaning. The fact that 449 is a single compound, not a combination of powder and liquid requiring constant attention, is an outstanding advantage. Unusually long bath life makes it attractive from an economy standpoint.

FORMAX

the Perfect Combination

FROM START TO FINISH

ZIPPO CLOTH BUFFS

These famous long-wearing buffs run cool under all buffing conditions. High count bias-cut cloth is assembled on ventilated steel centers. Each section is perfectly balanced and faced—requires no raking.

BUFFING COMPOUNDS

Formax produces a complete line of buffing compounds in bar, tube and liquid form.

Our extensive manufacturing, laboratory and testing facilities are at your disposal.

ZIPPO SISAL BUFFS

You have a pleasant surprise coming if you haven't tried the new Zippo bias-type sisal buff. It was specifically developed for steel buffing—to blend polishing grit lines—to cut down stainless steel—and bring up a bright lustre.

Other Formax products include the well-known C-20 Flexible Contact Wheels and F-26 Abrasive Belt Grease Stick.

Descriptive Catalogs Sent on Request

FORMAX MFG. CORP.

DETROIT 7, MICHIGAN

"THE FOUR McALEERS"

NO CURE-ALL FOR SALE!

Experience with plating waste treatment has shown staff and consulting engineers that no one process or type of equipment is generally applicable to all problems. Thorough evaluation of the many factors involved is necessary in each case.

Whether the solution required is ion exchange or precipitation Graver has complete equipment to do the job.

Graver can offer you:

*Choice of either basic process and equipment

*Engineered flexibility to suit individual requirements

*Advanced equipment design proven in hundreds of installations

*Over 45 years' experience in the water and liquid treatment field

WRITE FOR BULLETINS AND TECHNICAL ARTICLES:

WC-103 A — Reactivators • WC-111 — Ion-Exchangers
T-136 — Plating Waste Solutions — Recovery or Disposal
T-130 — Ion Exchange A Practical Tool in the Plating Room
T-123 — Applications of Ion Exchange to Plating Plant Problems

GRAVER

Industrial Waste Treatment Dept. W-113

GRAVER WATER CONDITIONING CO.

A Division of Graver Tank & Mfg. Co., Inc.

216 West 14th Street, New York 11, N. Y.

When you deal with Federated sales and service engineers you'll find their talk of extra service is more than just lip service. As an example, Federated provides free bath analysis for plating shops that wish to use Zimax, the efficient addition agent for zinc plating; and free adjuster solutions are provided with Cadmax, Federated's effective brightener for cyanide cadmium plating, so that no break-in period is required.

Federated provides a well rounded line of quality plating materials and electrochemicals:

ANODES:

All types of copper; zinc; tin; tin-lead; cadmium; brass; silver and lead anodes, including the famous Conducta-Core that lasts three times as long, gives greater throwing power.

NICKEL SALTS:

Domestic nickel salts produced under quality control methods that assure identical plating characteristics from every lot.

ADDITION AGENTS:

Zimax and Cadmax provide maximum throwing power, maximum coverage, maximum allowable current density, maximum brilliance and maximum lustre.

Talk to your Federated dealer or sales engineer to convince yourself that Federated's knowledge and nation-wide facilities can help increase shop efficiency and add to your profits.

Federated Metals

DIVISION OF AMERICAN SMELTING AND REFINING COMPANY
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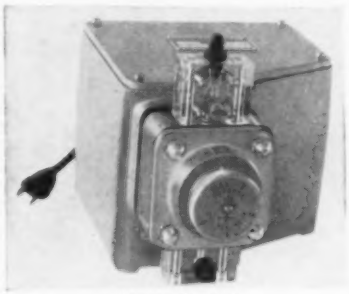
In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

Aluminum, Anodes, Babbitts, Brass, Bronze, Die Casting Metals, Lead, Lead Products, Magnesium, Solders, Type Metals, Zinc Dust

EQUIPMENT & SUPPLIES

E—822. Safe Plating Wastes—Concentrations of chromium, cyanides, acids, and other poisonous substances must be neutralized before discharge to waste. Otherwise, sewage treatment plants cannot perform their duties and there is danger of stream or ground water pollution. While there are many partial solutions to this problem, Paddock offers one of the simplest and least expensive solutions for the smaller plant.



Feeder Control

Although normally used as hypochlorinators, these new Paddock feeders can easily introduce appropriate neutralizing chemicals into the waste line at any desired rate up to 12½ gallons per hour. They are adjustable to various flows and concentrations and operate automatically by electric drive. Painstaking testing shows that they maintain an accurate, metered feed with little attention other than replenishment of the chemicals.

For this reason, they may also be used in feeding solutions at a predetermined rate to hold the plating bath itself at the proper balance and prevent variations in the final product. For precise information regarding use with your own particular chemicals, use the Readers' Service Card.

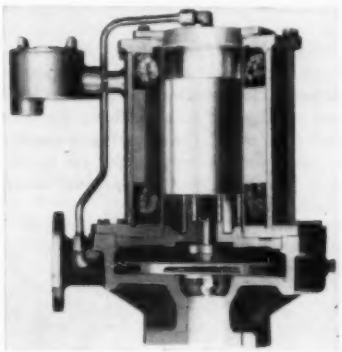
E—823. Materials Handling Tool—A new materials handling accessory tool called the Barrel Buddy Hole Former has

Handling Tool

has been developed by the Huron Steel Treating Co., Mich. The new tool will simplify the age-old problem of moving steel barrels in manufacturing plants. It cuts clean, nonjagged holes in the barrel with only slight pressure on its handle. Chain hoist hooks can then be readily attached to move the barrel.

E—824. Two-Side Conveyor-Type Abrasive Belt Grinder—For high-speed precision surfacing both sides of flat parts a new two-level conveyor-type belt grinder has been introduced by Engelberg Huller Co., Syracuse, N. Y. This wet-or-dry belt grinder features a dual conveyor arrangement, with turnover hopper device. It is designed to grind both sides of ferrous and nonferrous metals, plastics, glass, ceramics, and other materials in a single automatic cycle.

E—825. Leakproof Centrifugal Pump—With no seals or stuffing box, the Chempump Corp.'s centrifugal pump handles cyanide and other plating solutions with absolutely no leakage or contamination.



No Seal

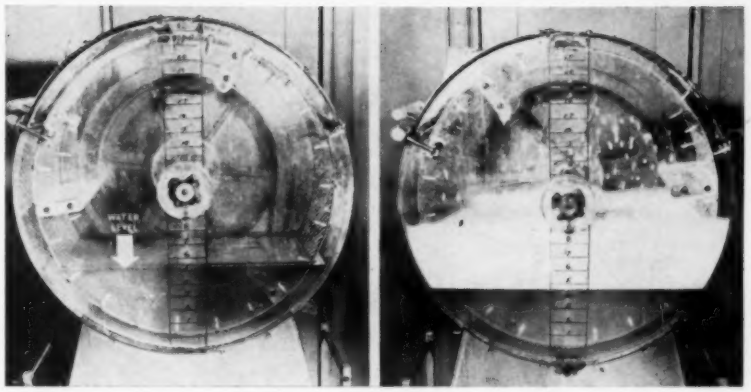
Design secret of the Chempump combines pump and motor in a single hermetic unit. Pumped fluid enters the motor section, cooling that part, and providing automatic bearing lubrication. A corrosion-resistant liner isolates motor windings from the pumped fluid.

Chempumps are available in a wide choice of construction materials including stainless steel, Monel, Hastelloy B and titanium. Heads range to 195 feet and capacities to 250 gpm, while fluid temperatures and pressures may be as high as 1000° F and 5000 psi respectively.

E—826. Nonfoaming Product for Burnishing—As shown by the photos, Wyandotte Chemicals new product for burnishing ferrous parts—Burnek 452—is nonfoaming—even at high concentrations.

Two oz/gal solutions of Burnek 542 and another burnishing powder were placed in similar plastic wash wheels—to the 5 inch levels. Wheels were then run for 2 minutes at 36 rpm, reversing every 9 revolutions. Photographed immediately after this intense agitation, Wyandotte's new burnishing powder showed no suds compared to the voluminous suds produced by the other product.

In addition to its nonfoaming characteristic, Burnek 452 is claimed by its manufacturer to be nondusty, to produce high luster in minimum time, to be usable in any kind of water and to dissolve completely in cold water—rinse freely with cold water. With Burnek 452, lightly soiled work requires no precleaning since the product has detergent properties of its own.



Non-foaming vs. Foaming

New
THERM-X
IMMERSION HEATER
BUILT-IN CONTROL...
for FAST,
LOW COST,
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• ACCURATE and DEPENDABLE TEMPERATURE CONTROL
• LENGTHS FROM 12" to 48"
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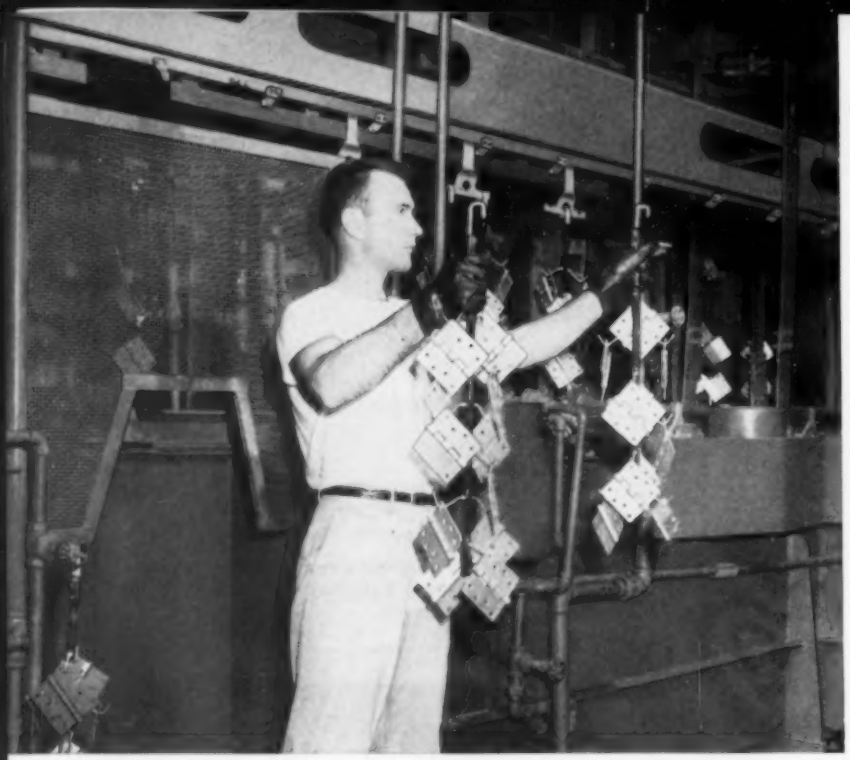
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 818.



PRODUCTION INCREASED—
UNIT COSTS LOWERED with
UDYLITE AUTOMATIC PLATING MACHINES

Each day, over twenty thousand door hinges are cadmium, copper and brass plated by three Udylite automatic machines owned by C. Hager & Sons Hinge Manufacturing Company, St. Louis, Missouri. Cadmium plating is for protection from rust and corrosion—the copper and brass plating for a gleaming, luxurious finish.

The Hager Company installed these machines five years ago when it was decided to eliminate their hand operations. Production has increased one hundred fifty percent with the Udylite Automatics—the finishes are more uniform—the rejects reduced to practically nil, and as with most Udylite machines, there is very little maintenance.

Have you checked your metal finishing operations lately? If you do plating, anodizing, blackening, or other types of metal finishing in volume, you should investigate the Udylite automatic equipment and Udylite finishing processes. They are known the world over.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST
PLATING SUPPLIER

EQUIPMENT & SUPPLIES

E—827. Bright Nickel Plating Process—High leveling characteristics of a new bright nickel plating process called Levelume are revealed in photomicrographs taken at Hanson-Van Winkle-Munning Co., where the new process was recently developed.

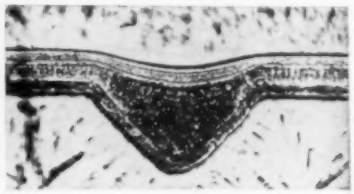


Photo No. 1, magnified 1,000 times, shows a grooved rough surface (center of picture). Two coatings of Levelume have been applied to this surface: the first leveled the metal, the second (thin coating at top of picture) was applied for brightness. Total thickness of combined Levelume coats: 0.0015 inch.

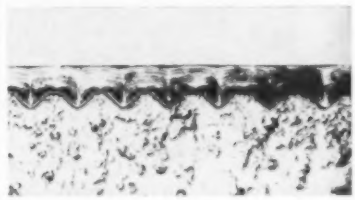


Photo No. 2, magnified 120 times, shows a surface with a series of grooves, 0.0015 inch deep. The area above the grooves is a bright Levelume finish, 0.002 inch thick. High leveling characteristics of Levelume are indicated by the evenness of this deposition.

Recently introduced by H-VW-M, Levelume is reportedly the first bright nickel process to combine qualities of "full" brightness, high leveling and exceptional speed. Field tested in several high-production installations, it has indicated deposition rates 100 per cent higher than the fastest comparable processes, coupled with economies of installation and operation.

Practically any existing nickel plating installation can be converted to Levelume in a few days, H-VW-M reports. No special auxiliary equipment is required. Tanks have only to be cleaned and leached. Almost any rubber-lined tank previously used with bright nickel solution can be employed with the new Levelume process.

New addition agents are the key to the new process' success. These make it possible to use an activated carbon pack in the filter for the plating solution. This continuously removes harmful organic contaminants, eliminating the need for costly and time-consuming periodic batch purification.

EQUIPMENT & SUPPLIES

H-VW-M also reports these advantages for the new process:

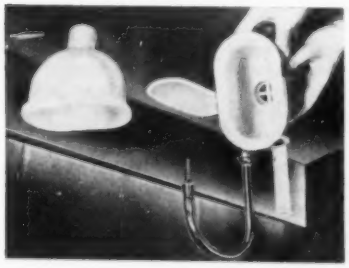
1. Good ductility and controlled stress in either the compressive or tensile side, eliminating cracking, crazing and brittle deposits.
2. Effective plating within a wide current density range—from 20 to 150 asf (normal asf: 60 to 100).
3. High leveling characteristics, eliminating in some cases subsequent polishing and buffing, as well as reducing post treatment processing.
4. High surface activity of deposits.
5. Uniform brightness of recessed surface area.

Other advantages include: bath stable in operation, pleasing white color deposits, simplified control, high tolerance to impurity and low operating costs. With the bath agitated and continuously filtered, roughness of deposits is not encountered.

E—800. Curved Bars—Schaffner Mfg. Company, Pittsburgh, Pa. announces the availability of curved bar buffing compositions for automatic buffing or polishing operations designed to fit curve bar applicators. These bars are available in tripoli, stainless, lime, or coloring compositions. Full range of cutting and coloring powers are available.

All Schaffner curved bar compositions have been thoroughly production tested. These bars are 2 inches thick, 4 inches wide, and on an 8 inch radius.

E—828. Drain—A polyethylene cup sink drain, introduced as the latest addition to its complete line of corrosion-resistant laboratory ware, has been announced by the American Agile Corporation, Ohio.



Easy Clean

The drain is injected molded in one piece of natural color polyethylene. It has a 5/16 inch wall thickness for maximum rigidity and long service life which is virtually unlimited when used according to the inherent features of polyethylene. It is corrosion proof to virtually all acids and alkalies and to a large variety of solvents. Its nonsticking, smooth surface, characteristic of polyethylene, allows for easy cleaning, and its sparkling white color will add a look of cleanliness to any laboratory.

UDYLITE TEAMS WITH MacDERMID
TO SERVE YOU FROM *18* STOCK POINTS
FAST DELIVERY FOR METAL CLEANERS

MacDermid metal cleaners and specialties can be shipped to you from any of the eighteen warehouses located strategically throughout the United States.

This means you can keep your inventories down, reduce freight costs and enjoy faster deliveries from nearby warehouses.

In addition to Udylite research, analysis and testing laboratories, you can benefit by two MacDermid specialized laboratories. You have at your call the combined skill and know-how of forty-five Udylite field service men and twelve technically trained MacDermid representatives.

You are served with a complete line of metal cleaners for all base metals and a variety of well known MacDermid specialties.

On any metal finishing problem check your Udylite Representative or write direct.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST
PLATING SUPPLIER

EQUIPMENT & SUPPLIES

E—829. Waste Disposal Installation—The C. N. Flagg & Co., Inc., Meriden, Conn. has just completed one of the largest and most complete Industrial Waste Disposal installations in New England, for one of its clients.

Basically the system operates as follows: The waste oil is received into waste oil sump. Then it is pumped into two first stage treatment tanks, each with a 10,000 gallon capacity, for removal of free oil and breaking of soluble oil emulsion. This is accomplished by adding acid and calcium chloride which is agitated for twenty minutes. The oil is skimmed off and flows to oil waste tank, then pumped to salvage oil tank for reclaiming.

After being skimmed, the solution is pumped at the rate of about 75 gal/min to the inner section of the final stage treatment tank where ferric chloride and lime are added. The sludge is pumped to a sludge tank and the oil is skimmed off into the oil waste tank and the clear effluent passes on to a nearby stream.

E—830. Acid-Proof Silicate Mortar—A new type of corrosion-proof mortar, Corlok, is the Penn. Salt Mfg. Co.'s latest development in silicate bonding material. Especially designed for the installation and maintenance of stack linings and acid tanks, Corlok is based on a precisely adjusted potassium silicate, is essentially free from sodium silicate or other sodium compounds, and contains no fluoride setting agent. It withstands strong oxidizing acids, nitric, chromic and concentrated sulfuric, and is resistant to sulfation and highly concentrated acids at temperatures up to 1900° F for longer periods than any other acid-proof silicate cement. The product is non-corrosive to metals and will not react with lead or chrome-nickel alloys.

Two materials are used to prepare the Corlok mortar—a potassium silicate solution which is entirely new, and a powder packed in 100-pound polyethylene-lined bags, dated to ensure best results within a specified time limit.

E—831. Sept-X—Now you can avoid the trouble, inconvenience, filth and expense caused by a sluggish septic tank. A new product, manufactured by Rooto Corp., called Sept-X, clears *and* activates septic tank systems in one operation! No second product or reactivating agent is needed!

Sept-X helps to increase the bacterial activity in the tank, liquefying the solids and restoring a steady flow to the system. Sept-X does a very effective job in drywells, cesspools and drain fields as well as in septic tanks. One two-pound can is recommended for each 500 gallons of tank capacity. Periodic use of Sept-X will keep the septic tank system in steady, efficient operating condition.

E—832. Cloth and Sisal Multi-Tooth Buffs—Schaffner Mfg. Co., Pittsburgh, Pa. announces the release to metal finishing trade, their 2 new sectional types of buffing wheels. Type Number 1: Schaffner cloth and sisal multi-tooth buffs. They are designed for heavy and medium metal finishing processes for fast thorough cutting and color of intricate contoured metal surfaces. Multi-tooth cloth and sisal buffs will cut and color metal in a single operation. Both types of buffs utilize double folded tufts to provide maximum cutting surface and hold buffing compound at the leading edges and on the buff's circumference. Teeth are staggered in a double row around the buff to prevent streaking. This also makes the buff self-ventilating for cooler operation.

All sisal and cloth used in these buffs is cut on a bias to provide greater strength and longer buff life. This also eliminates the problem of loose ends which can scratch, gouge or cut the surface of the metal to be buffed.

Type Number 2: Schaffner all cloth multi-tooth. These buffs are made of top grade 86/93 bias cut buffing cloth, with each tooth stitched twice to assure greater flexibility of the buff. Multi-Tooth cloth buffs can be used for getting faster, safe cutting—coloring jobs that do not require a buff as sturdy as the sisal Multi-Tooth buff. Cloth Multi-Tooth buffs produce a smooth metal finish and can be used on any medium to heavy metal finish job. Sisal multi-tooth and cloth multi-tooth buffs are available in diameter ranges from 10 to 24 inches.

PHELPS DODGE REFINING CORP.

PHELPS DODGE REFINING CORPORATION NICHOLS TRIANGLE BRAND CHEMICALS NEW YORK, N.Y.

Serves the Plating Industry with:

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COPPER SULPHATE

TRIANGLE BRAND

NICKEL SULPHATE

PHELPS DODGE REFINING CORP.

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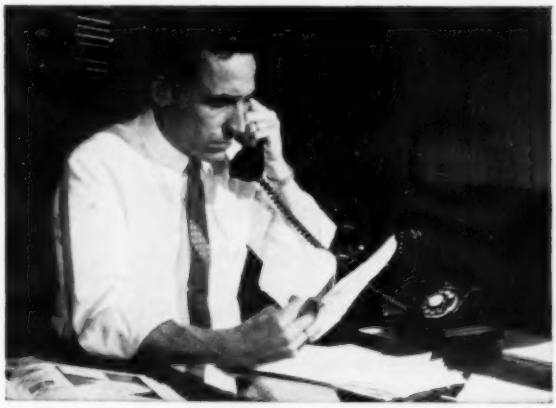

CUSTOMER IN COLUMBUS needs a special proprietary chemical *immediately*. Manufacturer of the chemical has none on hand — nearest stock point is 350 miles away. Situation desperate, can Merchants do something?

MERCHANTS' MAN IN CINCINNATI calls the manufacturer, locates several drums of the chemical at the plant of a nearby soap company. They agree to lend three drums to meet the emergency. Merchants' truck makes the pickup.

AT MERCHANTS' WAREHOUSE, the drums are loaded into the car of "Dutch" Spatta, manager of Merchants' Cincinnati office. Regular delivery by truck will take too long.

A FAST 108 MILES LATER "Dutch" delivers the drums in time to keep production going. It was somebody else's product and somebody else's problem, but Merchants again lived up to its reputation for helping a customer out of a jam.

WHY MERCHANTS' CINCINNATI MANAGER DROVE 108 MILES TO DELIVER SOMEBODY ELSE'S PRODUCT —

At Merchants, service goes beyond the mere filling of orders for industrial chemicals. Each office of Merchants' nationwide chain makes a point of becoming familiar with its customers' problems. In the past 35 years Merchants has frequently "walked the extra mile" to help a production man out of a tight spot. Among the products offered are acids, alkalis, fungicides, surfactants, chlorinated solvents, emulsifiers, laundry compounds, soaps, dry ice and chemical specialties.

SERVICE QUALITY MERCO

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Nickel anodes up to 93 inches in length —cast in new shell mold process. This unique method of casting produces anodes of the highest purity—with optimum metallurgical properties. Density of anodes is at a maximum and excellent surface is obtained. These factors account for longer life in plating bath.

NICKEL RECASTING PRICE SCHEDULE

ANY QUANTITY only 99+ purity accepted

15c PER POUND

FOB UNIVERTICAL

Laboratory Controlled

Write or wire for best price and delivery on the following Anodes:

Copper-Electro Deposited	Phos. Copper
Copper-Cast Round 3" Dia.	White Brass
Copper-Cast Round 2½" Dia.	Zinc
Copper-Cast Beehives	Tin
Copper-Cast Balls	Lead
Copper-Forged Balls	Carbon
Copper-Rolled Oval 1½" x 3"	

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SINCE 1939

COVER STORY

Water's Shapes and Colors

Water gets into the strangest and most exciting shapes and places. It is everywhere—rain, oceans, lakes, rivers, ice, snow, steam clouds; earth is more than three-quarters water, man is about 90 per cent water, corrosion is water, erosion is water, plating is water.

Our cover takes water as it appeared in a study of repellancy and has superimposed upon it the flowing colors which are most common to water. Here are to be seen the muddy, basis of streams and sumps; the greenish reflections of forests and shores and the bright blues of the sky.

The basic picture for the cover was provided by Lloyd Gilbert of Rock Island Arsenal. In chasing the answers to corrosion, he rigged an apparatus which drops a measured amount of distilled water from a measured height onto the silicone-covered, phosphated-coated steel. The water is repelled and forms the characteristic globules shown on the cover. The dispersion of the droplets of water becomes a measure of repellancy. The picture is not enlarged photographically. It is a direct print of a negative obtained from shooting through a microscope which is enlarged only by ten magnifications.

Taken together, the dispersed droplets, the dry surrounding surfaces and the superimposed color provide a startling, even if curious, design which is expressive of water's shapes and colors. PLATING is indebted to the Rock Island Arsenal, Rock Island, Illinois and to Lloyd Gilbert in particular for the cover picture used so aptly to illustrate a feature issue on water purification and waste disposal.

THE EDITOR

3 STANDARD SHAPES

"RECTANGULAR"

"TEAR DROP"

"DOG BONE"

NEW!

SHAPED, EXTRUDED APW SILVER ANODES

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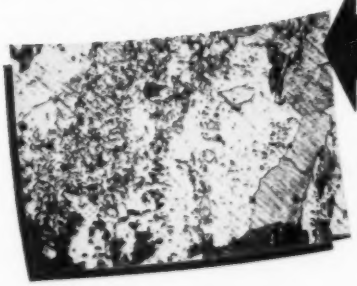

ROLLED FLAT PLATE ANODE SECTION: Photomicrograph illustrates highly irregular, uncontrolled grain size—a major cause of shedding and rough electrodeposits.

*Pat. Pending

APW EXTRUDED ANODE SECTION: Note small, fully controlled regularity of grain size to promote uniform corrosion, smoothest electrodeposits and less rejects.

The three standard shapes of APW Extruded Anodes were developed to extend the useful life of anodes—*to lower plating costs!*

Through scientific design, the distribution of mass material helps to maintain a more efficient ratio between anode weight and active surface area. After 85% by weight has been plated off, this APW anode *retains 80% of its original active surface area!* You profit three ways with longer anode life, minimized polarization and less silver scrap to be refined.

Another equally important advantage of the new APW Extruded Anode is the small, uniform grain size—*controlled between definite ideal limits!* As a result, corrosion is smooth and uniform for consistently smooth electrodeposits. Shedding is virtually eliminated—rejects are a comparative rarity!

To be certain the silver you buy in anodes is used most efficiently, APW will develop special anode shapes to meet particular plating bath conditions. We'll be glad to assist with your anode problems.

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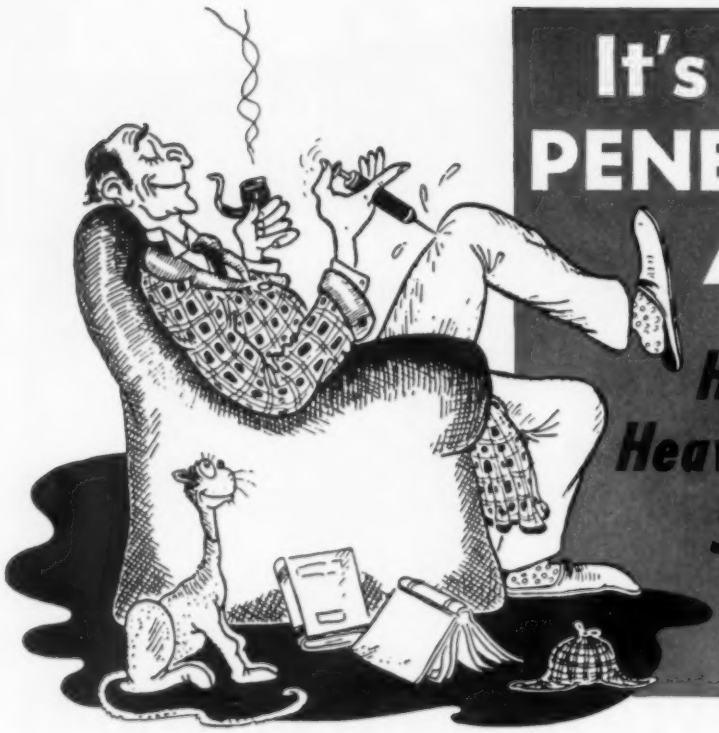

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This mild, low-pH soak cleaner is excellent for use on steel and most types of nonferrous metals, particularly to remove oily films with mineral oil base. Removes heavier oil films than most soak cleaners.

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This unique, low-pH soak cleaner is very mild . . . ideal on steel and stainless to remove drawing or stamping compounds and die lubricants with high metallic soap content . . . also drawing lubricants on phosphated surfaces.

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Often cleaning problems arise from the unknown nature of the materials which cause the soil . . . why not submit your problem to our laboratory for testing and recommendations . . . without obligation.

11

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Apothecaries Hall Co.

REPORTS FROM ALL OVER . . .
STRIPPED, CLEANED, DEGREASED

Water Resources are critical: Stream pollution is a problem. (Since 1850, the number of US incorporated communities has increased 15 times. Almost 50 per cent of US population now lives in the 140 metropolitan districts covering only 1½ per cent of the total US land area. Over 75 million people discharge their wastes through sewers into US waterways, with only a portion of these wastes being treated adequately).

•

The new portable (under 50 pounds) electrolytic water analyzer (DuPont Model W) was advertised by **Mfr's Engrg & Equipt Corp,** Hatboro, Pa., as being a revolutionary development in water analysis, and as measuring water content accurately down to better than 1 ppm. Freon and SO_2 refrigerants can be measured with such accuracy in 2–3 minutes. Many other liquids with boiling temperatures up to 100 C and more can be analyzed similarly.

•

Process stream analyzers (includes table listing instrument, maker, cost, applications): **Beckman Instruments** is said to be developing a series of anion analyzers based on its pH electrode system, and a flame photometer which should do for inorganics what infrared has done for organic compounds.

Toledo halted, at least temporarily, operation of its $772,000 city water softening plant because of difficulties in controlling taste and odor. Lime-soda ash treatment lowered pH of the water to the point where activated carbon treatment for taste and odor was not effective.

•

When a sewage works in the South of England found that its sludge beds were becoming increasingly inadequate, it turned to use of rotary vacuum filters with nylon as the fabric. Today, efficiency is said to be so great that two filters in an installation covering only 100 square yards can handle more sewage sludge than the 57,000 square yards of sludge beds used previously.

•

New tubular filters, with flow from inside the tubes were advertised by **Industrial Filter & Pump Mfg. Co.,** as providing unequaled simplicity of maintenance and as being ideal for intermittent or continuous operation. They can be used with or without precoat. Filter is readied for use by just rolling flat sheets of filter paper and inserting them in tubes designed to force the paper snugly against the tube wall. Even the tubes are easy to remove, being held in place by a simple rubber O-ring device.

First Class Permit No. 4032, Sec. 34.9, P. L. & R. Newark, N. J.

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August 1956. Do not use after October 15, 1956

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(INQUIRIES FORWARDED PROMPTLY TO PROPER SOURCE)

Traveling pan filters for strong acids maintain filter cloth porosity without periodic shutdown. Dorr-Oliver new-type vacuum filter, developed specifically for handling phosphoric and tartaric acids, consists of traveling pans attached to an endless belt to maintain the filter medium at peak efficiency continuously without taking them out of service for cleaning of the cloth. The filter was developed by *M. Giorgini*, **Dorr-Oliver SpA**, Milan, Italy.

•

Porous metal filters: In a recent application, a magnetic filter element in an inline housing with a relief valve, on an airborne installation, was required to handle 8 gpm of MIL-0-5606 fluid at 275 F at 3000 psi. Operating pressure drop was less than 20 psi; the cartridge portion is expendable.

Metal recovery from an ore via ion exchange: Usually the ore is treated with a solution which dissolves the metal which then is recovered from the filtrate after insoluble matter has been filtered off. A British process, being studied, eliminates the filtration step. The ion exchange resin later would be removed from the pulp of ore and extracting solution mechanically and passed to an eluting circuit.

•

New-type metals made of hydrogen or ammonia will become a reality soon, according to *H. Hall*, **Brigham Young U.** These new metals would be made by "squeezing atoms so hard that they will shrink in size and form substances that behave differently than those made out of unsqueezed atoms." Ammonia "soon" will be changed into a metal when subjected to 3 million psi.

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SILVER (US Treasury Price, 1.000 fine	90.50¢
TIN (Spot delivery)	95.87½¢
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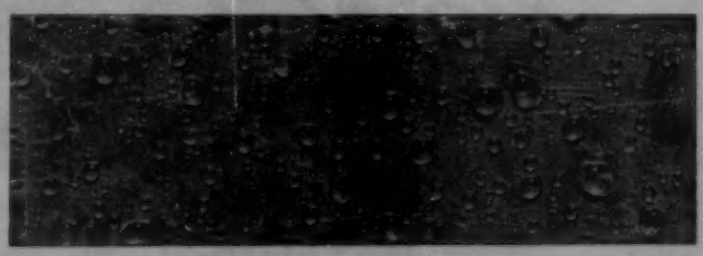

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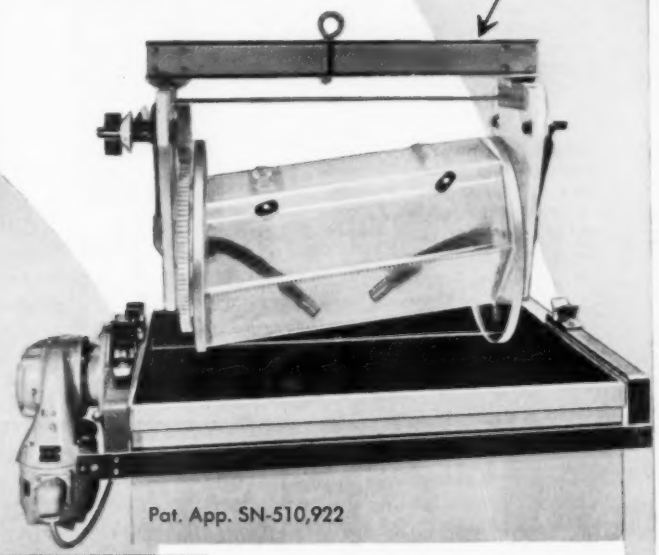
Eccentrically mounted cylinder oscillates as it rotates



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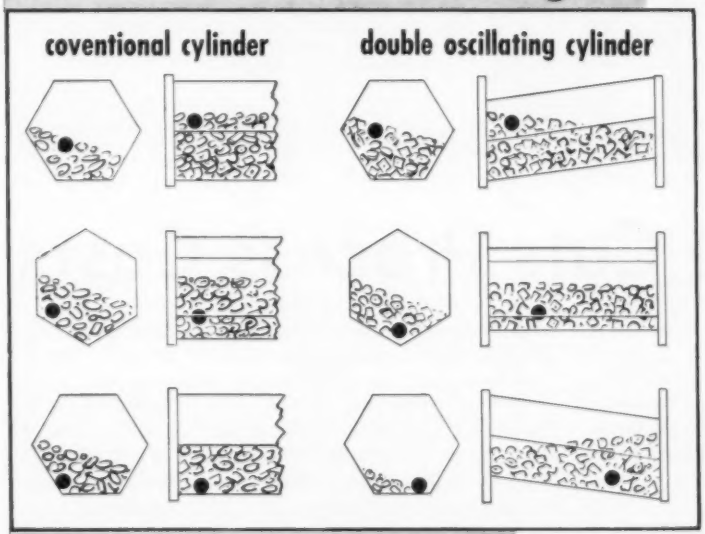
Why!

Because the parts move up and down, back and forth, round and round. All faces are exposed. You get a specified thickness on all surfaces in less time.

See the difference

The diagrams below illustrate the difference in mixing action. The black spot represents a marked piece in the work.
Note how the black spot moves round and round in the conventional cylinder.
Then note how the black spot moves both around and across in the Double Oscillating Cylinder.



Mixes work the way a plating cylinder should

When you see this new multiple mixing action you'll agree it's the way a plating barrel should work and want no other kind.

Fortunately, all the new multiple mixing action comes from the cylinder. You can get wonderful improvement using the new cylinders with present equipment, but complete barrels designed throughout for double oscillation give even greater benefits.

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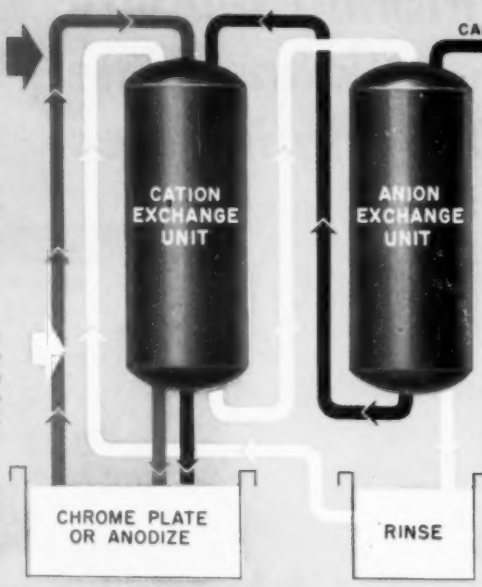
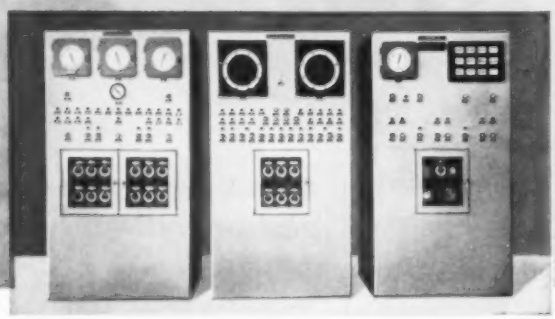
RENEWS PLATING BATH. This cycle removes aluminum, copper, iron and other impurities . . . allows continued re-use of bath . . . eliminates disposal problem. Compared with the usual toxic-waste disposal equipment, ion exchange saves up to 50% on initial costs, 75% on operating costs, 80% on floor space.

RENEWS RINSE WATER. Cation unit removes metallic impurities . . . anion unit removes chromic acid . . . allowing continued reuse of rinse water. Cuts consumption 90%!



RECLAIMS CHROMATE. This cycle picks up chromic acid removed from the rinse water and returns it to the plating bath. Chromate saved in the plating bath and rinse water often pays for the entire ion exchange installation!

SAVINGS FOR SMALL PLANTS. Ion exchange economies apply to small plating plants as well as large.



AUTOMATIC CONTROLS for ion exchangers in an auto parts plating plant. These controls simplify operation. No specially trained operators or technicians required.

©The Permutit Company

Ion Exchange Cuts Process Costs

Modern ion exchange equipment really pays off for plating plants. Here's why:

Faster production. Dip periods are shorter, and there's no down-time for dumping because baths are always at full strength. Time savings are biggest for bright-dipping, anodizing, etching, stripping.

Better quality. Clean baths produce more uniform plating deposits. Clean rinses prevent water stains and spots.

Lower operating costs. Contaminant-free baths use less current. The improved quality means fewer rejects . . . and reduced polishing and wiping costs. A large aircraft manufacturer saved $10,000 on anodizing in the first year with ion exchange. A leading auto maker prevented a stream pollution shut-down, improved quality, reduced costs . . . and uses the same ion exchange equipment for treating other process water in the plant!

Largest manufacturer of ion exchange equipment, The Permutit Company, is the only firm that offers a complete ion exchange service: rinse water or bath analysis, engineering, equipment, ion exchange resins and automatic controls . . . *all from one source.*

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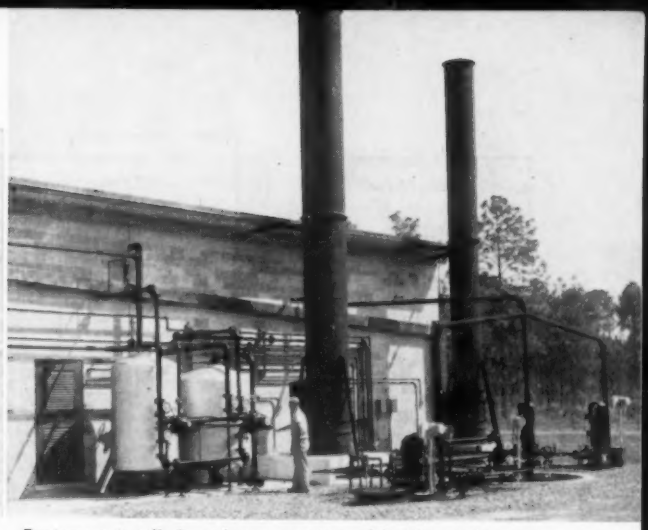
THE TREATMENT OF METAL PLATING WASTES AT SPERRY'S GAINESVILLE, FLORIDA PLANT[1]

By FRED A. EIDSNESS[2] and PAUL B. BERGMAN[3]



Equipment installed outdoors consisting of holding tanks, pumps, level control equipment in foreground

The construction of the new Sperry Rand plant at Gainesville was started in September 1954 and completed in March 1955 at a building cost, exclusive of equipment, of approximately one million dollars. The plant, which is modern in every respect for the production of these tubes, was designed by the firm of Ebaugh and Goethe, Consulting Engineers, and John E. Pierson, Architect, both of Gainesville, Florida. Six hundred thousand dollars ($600,000) of the total construction cost of the building was paid out of funds of the Employees' Fidelity Fund of Gainesville, Florida, a non-profit organization set up out of the City of Gainesville Employees' Pension Fund group.

Recognizing the problems of proper quality water for the plating room operation and the discharge of wastes occurring in this operation, Black and Associates, Inc., Engineers of Gainesville, were requested to handle these features of the project. Since all of the waste treatment methods for metallic cations and the removal of quantities of cyanide are well known to the industry, there seems little use in reiterating these facts. Information obtained from Sperry's technical division indicated that the waste treatment problem would consist of the discharge of quantities of nickel, copper, silver and cyanide ions from the plating operation. It was requested that demineralized water at a maximum rate of 50 gal/min be provided for the plating room operation.

The first problem to be considered in the design of the waste treatment process was the lack of a nearby receiving stream. Several drainage ditches from the abandoned Army airport facilities were available, but during periods of no rainfall these ditches are dry. It was, therefore, obvious that any effluent from the waste treatment process would have to be disposed of by vertical drainage and since such vertical drainage would act as recharge of the underlying aquifer, all toxic ions had to be reduced to a minimum.

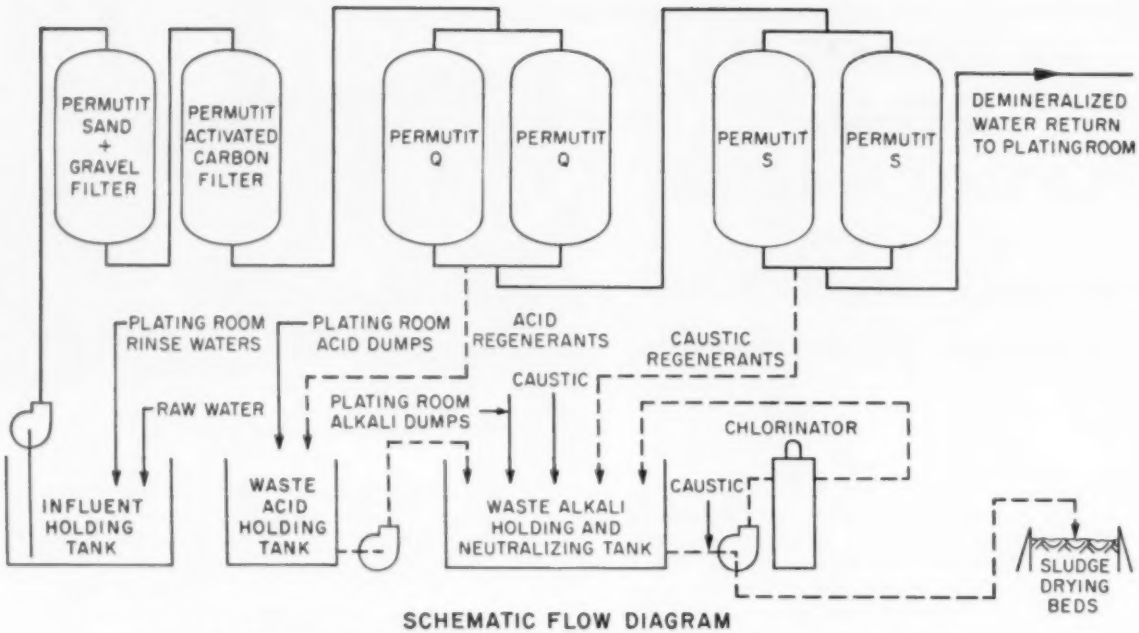
The raw water provided for demineralization comes from deep wells, has a trace of hydrogen sulfide which is removed by chlorination, and contains total cations and anions each of 12.8 gr/gal expressed as calcium carbonate. After considerable engineering analyses, it was decided that the most adequate way to handle the demineralization and waste treatment problem was first to provide a demineralization plant having a capacity of 50 gal/min; its design based on the quality of the raw water. After one pass through the plating room operation, the waste water consisting of that brought about by drag-outs would be recirculated as a stream through the demineralization plant. Therefore, under this recirculation method, the cation units would also be responsible for removing nickel, copper, and silver, with the anion units also removing cyanides. Upon exhaustion of the demineralization units, both the cation and anion units would be regenerated, the cation regenerate being discharged into an acid holding tank and the anion regenerate being discharged into an alkali holding tank. This operation alone would decrease the amount of waste from approximately 72,000 gal/day to approximately 2000 gal/week. To the cyanide present in the alkali regenerate tank is added sufficient caustic soda to raise the *p*H to the proper value, and the waste is recirculated and chlorinated through a Wallace and Tiernan Chlorinator to an extent where the cyanides are completely oxidized to nitrogen and carbon dioxide. After complete oxidation of cyanides, the acid regenerate waste, consisting of the metallic cations of copper, silver, and nickel, is pumped from the acid to the alkali regenerate tank, where additional caustic is added to obtain a *p*H of 10.5, in which, upon agitation, the copper and nickel precipitate as the hydroxide and the silver as the chloride. After complete precipitation, the wastes are pumped to a sludge drying bed.

The demineralization and waste treatment plant is indicated in Figure 1 and consists of the following units. There were supplied two 30 inch diameter cation exchange units, each having a maximum flow rate of 50 gal/min having a capacity of 240 kilograins when operating on raw water containing 12.7 gr/gal as $CaCo_3$. A sulfonated styrene type cation resin (Permutit Q) is used in each

[1]Because of the increasing demands for large quantities of Klystron Tubes, the Sperry Rand Corporation established a new division known as the Sperry Electronic Tube Division of Sperry Rand Corporation at Gainesville, Florida, the home of the University of Florida. The first tubes to be produced at Gainesville are the 20,000 Watt SAL-39 Klystrons designed to power ground transmitters in a new military air-navigation system.

[2]Vice-President, Black and Associates, Inc., Engineers, Gainesville, Florida.

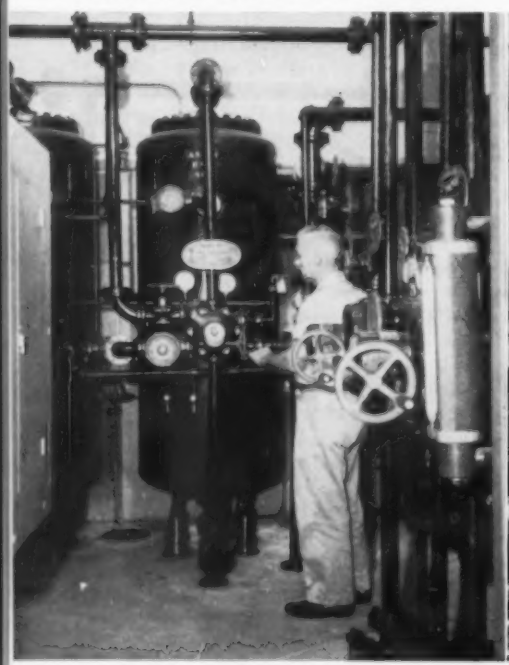
[3]Building Services Superintendent, Sperry Electronic Tube Division of Sperry Rand Corporation, Gainesville, Florida.



SCHEMATIC FLOW DIAGRAM

SPERRY-RAND CORPORATION ELECTRONIC TUBE DIVISION, GAINESVILLE, FLA.

Anion Units on Left with main piping of cation exchange units on Right. This demineralization equipment removes dissolved solids from effluent rinse waters from the plating room, demineralizing same for return and re-use in the plating room



A view of plating room showing plating tanks and rinse tanks using demineralized water for rinsing and plating solution make-up

cation exchange unit. There are two anion exchange units, each 30 inches in diameter having a maximum capacity of 50 gal/min, and having an exchange capacity of 168 kilograins based on 15.1 gr/gal anions as $CaCO_3$. Each of these units is supplied with strongly basic polystyrene anion resin (Permutit S). Both the cation and anion units are constructed and equipped with standard accessories such as multiport rotary-type disc valves, flow meters, rate controllers, and other appurtenances. The cation exchangers were purposely oversized to protect the anion exchangers against metallic cations slipping through and fouling the anion resin. Each anion unit is equipped with an effluent conductivity meter to indicate the necessity for regeneration of the demineralization plant. Each cation unit is regenerated by 66° Bé H_2SO_4 from carboys delivered by a Hills-McCanna metering pump. The anion exchange units are regenerated with 50 per cent sodium hydroxide from a storage tank delivered by a metering pump. These chemicals are diluted in a mixing chamber prior to the regeneration operation. In order to protect the demineralization units, these are preceded by a pressure sand filter and a carbon purifier. The purpose of the sand filter is to remove turbidity. The carbon purifier removes traces of residual chlorine in the raw make-up water for the protection of the anion unit.

The waste treatment process is devised to handle all wastes from the plating room operation. The acid regenerate from the cation units and all acid wastes from periodic dumps are discharged to a 1000 gallon acid holding tank. The alkali regenerate from the anion units and any alkali wastes from periodic dumps are discharged into a 3000 gallon alkali holding tank. This waste is first recirculated from this tank to a Wallace and Tiernan chlorinator in order to oxidize cyanides. NaOH is added by a proportionating pump to maintain proper *p*H. After cyanide oxidation, the contents of the acid holding tank are transferred to the alkali tank, additional NaOH added to maintain a *p*H of 10.5, agitated for 30 minutes and then pumped to drying beds.

A recording and indicating Beckman *p*H instrument is provided with cells which are installed in (a) the alkali regenerate and holding neutralization tank recirculation line in order to insure proper adjustment of *p*H during cyanide oxidation, (b) the influent holding tank in order to determine if HCN is formed, which would be vented through stacks to atmosphere, and (c) the alkali holding tank in order to insure a proper *p*H for precipitation of the metal cations.

The prime contractor of the plating room and waste treatment plant was Udylite Corporation, Detroit, Michigan, and all of the equipment for the demineralization operation was supplied by The Permutit Company, New York City. The plant has been in operation since July 1955 and has operated very satisfactorily.

Although the basis of design of the demineralization plant indicated approximately 20,000 gallons between regenerations for each cation unit and 11,000 gallons between regenerations on each anion unit, because of the recirculated stream of waste material actually about 30 to 40 per cent more capacity is obtained. The waste treatment plant is under the supervision of John M. White, Technical Process Engineer, and is operated by Malcolm Spindle. Monthly operating forms on which are reported the residual chlorine of the cyanide oxidation process and the *p*H of the precipitated metal hydroxides prior to disposal on the sludge beds, are sent to the Florida State Board of Health. The control measures consist of obtaining the presence of a free residual chlorine of 5 ppm after cyanide oxidation, and is measured on a Wallace and Tiernan amperometric titrator. A *p*H of at least 10.5 after 30 minutes agitation in the alkali regenerate tank is maintained prior to discharge to the sludge drying beds.

Calculations from the solubility products of copper hydroxide, nickel hydroxide, and silver chloride indicate that the approximate solubilities of copper are 0.02 mg/l; nickel, 1.0 mg/l; and silver, 1.4 mg/l. Periodic tests conducted by Black Laboratories, Inc. indicate that the supernatant of the treated metal waste contains concentrations in the magnitude of the theoretical.

Dr. Frederic A. Eidsness was graduated from College of William and Mary with a BS degree and from the University of Florida with a PhD degree.

He is associated with the American Institute of Chemical Engineers; American Society of Civil Engineers; American Water Works Assoc.—Past Chairman Florida Section, Past Director, Fuller Award; Federation of Sewage Works Assoc.—Past Director; Florida Engineering Society; Sigma Xi and Phi Kappa Phi.

Dr. Eidsness is a licensed Registered Professional Engineer, State of Florida.

Paul B. Bergman was graduated from Carnegie Institute of Technology in 1931 with a BS degree in building construction. After graduation he spent five years in town planning and zoning on Long Island. In 1937 Bergman entered the construction field on various building projects as Field Superintendent. Some of this work was as a partner in a small contracting firm. The early war years were spent with O'Driscoll and Grove, General Contractors, at Camp Campbell, Kentucky; Seneca Ordnance Depot, Seneca, New York; and Oak Ridge, Tennessee. Bergman joined the Sperry Gyroscope Company in 1943 in the Plant Layout Department and worked through various capacities to Plant Engineering Superintendent. In 1947 he obtained his New York State Professional Engineering License. He was transferred to the Sperry Electronic Tube Division, Gainesville, Florida, upon its organization and is presently serving as Building Services Superintendent.

PLANNING— CAN REDUCE WASTE TREATMENT COSTS

By F. L. NEFF

The method that has found widest acceptance in the metal finishing industry for treating cyanide waste is that of alkaline chlorination. Many excellent papers have been written which describe in detail the technology behind the treatment. The purpose of this paper is to present the factors that affect the choice of a treatment scheme in applying the alkaline chlorination method.

Summarizing alkaline chlorination itself, let it be sufficient for our purpose here to say that it is the controlled oxidation of cyanide that occurs within prescribed limits of *p*H and reaction time. Chlorine, source of the oxidizing power, breaks down the cyanide in two stages. The first stage, cyanide to cyanate, requires approximately one-half hour; the second stage, oxidation of the cyanate to bicarbonate† and nitrogen, requires an additional one and one-half hours.

The treatment schemes that are presently being used by the metal finishing industry may be classified under the following headings:

Batch treatment to either cyanate or bicarbonate and nitrogen.

Flow-through treatment to either cyanate or bicarbonate and nitrogen.

Orthotolidine type chlorine residual test kit for determining chlorine residuals by comparison of color

BATCH TREATMENT

Usually a full or half-day's waste is collected and treated in the same tank. The system operates on an alternating, two tank, fill and draw principle. One tank treating waste while the other tank collects waste. When using this system, tank capacity is based on the volumetric waste flow and is independent of reaction time. This is based on the fact that the minimum tank size considered would have at least four hours holding capacity. Smaller tanks are impractical due to the number of operations required to complete each cycle.

FLOW-THROUGH TREATMENT

The waste passes through the treatment tank on a continuous basis. Treatment tank capacity is based on volumetric flow rate and reaction time. The treatment tank is sized so that the retention of the waste stream will be either one-half hour or two hours depending upon the degree of treatment.

Factors that affect the choice of a treatment scheme:

A. *Degree of treatment*

The Federal, State, Interstate, or Municipal regulatory body prescribes whether treatment to cyanate or bicarbonate and nitrogen is required. In many cases the degree of treatment depends upon the system that will be receiving the treated wastes.‡ When treatment to cyanate is acceptable, chemical costs will be approximately one-half that required for treatment to bicarbonate and nitrogen. Also, the treatment tank capacity requirement for the Flow-Through System will be one-fourth that required for bicarbonate and nitrogen.

B. *Batch or Flow-Through*

The batch and large flow-through treatment plants are usually located in an area outside the plating room proper. The small flow-through treatment plant requiring relatively less floor space is usually located in the plating area.

The factors that normally influence the choice between a batch or flow-through plant are the total daily volume and the concentration of the waste. The batch method is most effectively utilized when the daily volume of waste is small, and in those cases where waste flow is irregular or intermittent. Variations in waste flow normally require a holding tank or sump sufficient in size to handle the peak waste load. This additional holding capacity is incorporated in the treatment tank itself when using the batch system. Tanks used to even out fluctuations in waste concentration are also eliminated in the

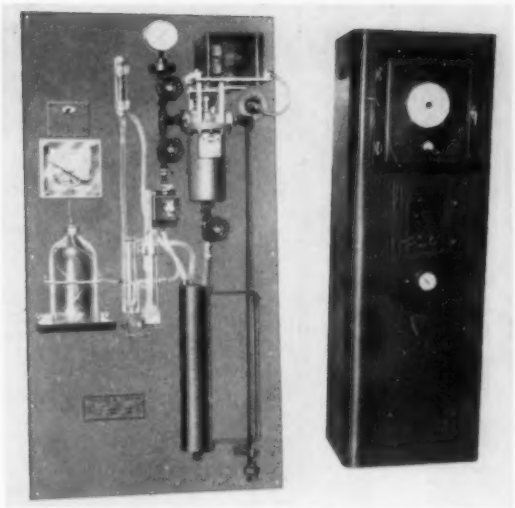
Note: All photos courtesy of Wallace & Tiernan, Inc.

* Wallace & Tiernan, Inc., Belleville, N. J.

† The actual decomposition product is CO_2. The basic waste solution retains the CO_2 in solution as the bicarbonate.

‡Under some conditions, local pollution abatement authorities may require that the metallic hydroxide sludges obtained from alkaline chlorination of cyanide wastes may require filtration for their removal from the treated solution before discharge to receiving bodies of water. Many authorities require that the cyanide be reduced to 1 ppm or less, and that the heavy metal salts be reduced to 1 ppm or less as well. Zinc, copper and cadmium, even if present as insoluble hydrate precipitates, must in many cases be removed from the treated liquor before it can be safely discharged. Changes in pH in the receiving body of water may cause these precipitates to redissolve and under these conditions the treated effluent will not meet a 1 part or less limitation on metal salts—Reviewer's contribution.

Amperometric type laboratory chlorine residual test kit for determining chlorine residuals by titration method



At left: Individual waste sampling cell provides signal for controlling automatic chlorination equipment. At right: Oxidation-Reduction Recorder provides automatic adjustment of chlorine feed rate in alkaline chlorination method of cyanide waste treatment

batch system, since the combined volume when mixed is of uniform concentration. Also, some prefer the batch system due to the additional safety factor that is obtained when analysis of the waste is made prior to discharge.

The flow-through treatment plant is used for large waste volumes when the cost of batch tanks out-weigh the other advantages of the system mentioned above. The flow-through plant requires provision for leveling out flow and concentration fluctuations and, in general, requires more attention and control than the batch system. Due to the reduced space requirements, some prefer to set up a small flow-through system in the plating area where the operation can be controlled by available personnel.

Treatment has also been set up in the plating room in the rinse tanks themselves, wherein the treatment chemicals are continuously present in the rinse water. Treatment in the rinse tank is accomplished by either recirculating the rinse in a closed or still system or by continuously adding a small amount of fresh make-up water, and purging treated rinse from the system during recirculation as in a continuous rinse. When the closed system is used, the treated rinse is dumped when the solution reaches a maximum dissolved solids concentration. When the rinse tank is continuously purged, dissolved solids level off at a maximum concentration value depending upon make-up rate and need be dumped only occasionally for removal of sludge from the bottom of the rinse tank. In using either of the rinse tank systems, the degree of treatment is by necessity to bicarbonate and nitrogen due to the prolonged reaction time involved.

If the initial investment and operating costs are estimated individually for the batch and flow-through systems, taking into consideration the possible use of available personnel, a choice based on the more economical system may be made. Fixed or chemical cost will be essentially the same for either system.

C. Treatment Chemicals

Either chlorine and caustic or hypochlorite solution are the reagents most commonly used for cyanide destruction. When chlorine and caustic are purchased separately and applied to the treatment system, the purchaser is in effect "making up" his own hypochlorite solution on the job. The alternate, as noted, is to purchase the prepared solution. It should be noted that the excess alkalinity of the prepared solution tends to increase the operating *p*H above the prescribed optimum. The necessity of *p*H adjustment with acid or additional retention time should be included with the other factors when making a choice of reagent. The oxidizing power of hypochlorite is measured in terms of "available chlorine" (one pound of "available chlorine" = one pound of dry chlorine gas). Once the unit cost of hypochlorite is obtained in terms of "avail-chlorine," a cost evaluation may be made by substituting in the following equations.

Purchasing Chlorine and Caustic

a. 6.82 x Cost of 1 pound of dry chlorine gas + 7.69 x Cost of 1 pound sodium hydroxide = Cost to treat 1 pound cyanide (as CN).

Purchasing Hypochlorite Solution

b. 6.82 x Cost of 1 pound "available chlorine" = Cost to treat 1 pound cyanide (as CN).

These equations are based on the theoretical chemical requirements (dry weight basis) for treating sodium cyanide to bicarbonate and nitrogen. The intended use of the equations here is to serve as a basis for cost comparison. The amount of chlorine and caustic, and hypochlorite, will vary slightly with

Materials for Making 1000 Gallons of Soda Bleach Solution*

Finished Bleach							Chlorine Required Pounds	Caustic Soda Required				Water Required for Diluting Caustic Soda Gallons	
Strength				Specific Gravity	Pounds per Gallon	Excess Caustic NaOH Weight %		98% NaOH Solid or Flake Pounds	50% Liquid Gallons	Diluted Caustic Soda Solution for Chlorination			
Available Chlorine			NaOCl Weight %							Solution Gallons	NaOH %	Solid or Flake	50% Liquid
Weight %	Volume %	Grams per Liter											
1.0	1.01	10.1	1.05	1.0142	8.455	0.10	84.6	106.0	16.3	989.6	1.24	991.6	979.1
2.0	2.06	20.6	2.10	1.0288	8.577	0.20	171.5	215.0	33.0	979.4	2.58	982.9	957.7
3.0	3.13	31.3	3.15	1.0438	8.702	0.30	261.1	327.1	50.3	970.9	3.80	974.0	935.6
4.0	4.23	42.3	4.20	1.0593	8.831	0.40	353.2	442.6	68.0	961.7	5.12	964.9	912.8
5.0	5.37	53.7	5.25	1.0752	8.964	0.50	448.2	561.6	86.3	952.4	6.46	955.4	889.4
5.25	5.66	56.6	5.51	1.0793	8.998	0.53	472.4	591.9	91.0	950.1	6.80	953.0	883.4
5.50	5.95	59.5	5.78	1.0833	9.032	0.55	496.8	622.5	95.7	947.7	7.15	950.6	877.4
5.75	6.25	62.5	6.04	1.0875	9.066	0.58	521.3	653.2	100.4	945.4	7.49	948.1	871.4
6.0	6.54	65.4	6.30	1.0916	9.101	0.60	546.0	684.2	105.1	943.1	7.84	945.7	865.3
7.0	7.75	77.5	7.35	1.1085	9.242	0.70	646.9	810.6	124.6	934.1	9.24	935.6	840.4
8.0	9.00	90.0	8.40	1.1260	9.387	0.80	751.0	941.0	144.6	925.4	10.68	925.3	814.7
9.0	10.29	102.9	9.45	1.1440	9.538	0.90	858.4	1075.6	165.3	916.7	12.15	914.6	788.2
10.0	11.61	116.1	10.50	1.1626	9.693	1.00	969.3	1214.5	186.6	908.2	13.64	903.6	760.8
11.0	12.99	129.9	11.55	1.1818	9.853	1.10	1083.8	1358.1	208.7	899.8	15.18	892.2	732.5
12.0	14.41	144.1	12.60	1.2017	10.018	1.20	1202.2	1506.5	231.5	891.2	16.75	880.4	703.3
13.0	15.87	158.7	13.65	1.2222	10.190	1.30	1324.7	1659.9	255.1	882.8	18.35	868.3	673.1
14.0	17.39	173.9	14.70	1.2435	10.367	1.40	1451.4	1818.7	279.5	874.5	19.99	855.6	641.8
15.0	18.96	189.6	15.75	1.2655	10.555	1.50	1582.6	1983.1	304.7	867.1	21.66	843.1	610.0

*Courtesy of Diamond Alkali Company

View of chemical feeding equipment used in a plating waste treatment plant. Plant is arranged for batch treatment of waste

other oxidizable substances and metals present in the waste.

In some large installations, hydrated lime is substituted for sodium hydroxide as the alkali when the reagents are added separately. The factor to be substituted in Equation A, if 90 or 85 per cent hydrated lime is used, would be either 7.84 or 8.52 respectively. The chlorine factor remains the same.

D. *Controlling Treatment*

The presence of a chlorine residual in the waste following a prescribed reaction time is the generally accepted criterion for assuming that treatment of the soluble cyanide present is complete. This assumption should be supplemented periodically by laboratory analysis for cyanide in the treated waste. A total chlorine residual test (combined plus free chlorine) is satisfactory when treatment is to cyanate. The test may be made by using the commercially available Orthotolidine, or amperometric type test kits. (Illustrations A and B.) A standard laboratory iodometric titration may also be used. The Orthotolidine test should be checked out before using, as the test is affected by interfering compounds, some of which may be present in the waste. When treatment is to bicarbonate and nitrogen, a free chlorine residual should be present to indicate that the reaction has gone to completion. For this purpose the amperometric test kit has been found to be the most satisfactory means for differentiating between the combined and free chlorine in treated plating waste.

The foregoing test methods indicate when treatment is complete but do not offer a means of automatically controlling treatment. When it is desired to record, control, or monitor treatment, the oxidation-reduction potential level of the solution is used to infer the presence or absence of cyanide, cyanate, or a free chlorine residual to insure treatment to bicarbonate and nitrogen. When controlling, the Oxidation-Reduction Recorder Controller takes an electric signal from a sampling cell and automatically adjusts chlorine feed rate. (Illustrations C and D.) Automatic control of this type is adaptable to either the batch or flow-through treatment plant.

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F. L. Neff is in charge of Industrial Waste Sales for Wallace & Tiernan Co., Newark, N. J. Most of his industrial experience has been in process, planning and development for industry following undergraduate and graduate work in chemistry & chemical engineering.

A GUIDE TO THE SELECTION OF ION EXCHANGERS FOR APPLICATIONS IN THE PLATING INDUSTRY

By DR. I. M. ABRAMS*

INTRODUCTION

The aims in using ion exchangers in the plating industry are (a) to improve product quality, (b) to prevent stream pollution and (c) to recover valuable constituents.

Treatment of raw water supplies frequently eliminates a number of difficulties. For example, simple water softening can prevent the precipitation of calcium-containing films often seen in nickel plating work or the incrustation formed on anode bags and air agitation pipes in bright nickel vats.[1] The problem of calcium sulfate precipitation becomes especially severe in heated baths. Cyanide plating solutions frequently show a haze which can be traced to dissolved minerals in the water supply.

Although water softening and filtration often remove sources of difficulty in the water, it frequently becomes necessary to completely demineralize a water to produce results which are free of stains, films, spots or roughness. This applies to such diverse operations as plating with nickel, chrome, gold or anodizing. On occasion, organic matter in the incoming water leads to hard, brittle deposits. Complete demineralization and removal of most organic matter may be achieved most economically by ion exchange.

This unit process is also being employed to prevent stream pollution and to recover valuable constituents of plating baths which were previously discarded. Both of these aims have been achieved by treatment of anodizing solutions, chrome plating solutions, rinse waters, etc., by cation exchangers, anion exchangers, or a combination of the two. Perhaps the most frequently discussed operation has been the cation exchange treatment of chromic acid baths to prevent build-up of trivalent chromium, iron, and aluminum cations.

In the same operation, the chromic acid dragout may be removed and recovered from the rinse water by anion exchange.

Iron has been removed from phosphoric acid pickling baths, thereby prolonging the life of the bath to a point wherein the costs are comparable to sulfuric acid pickling.

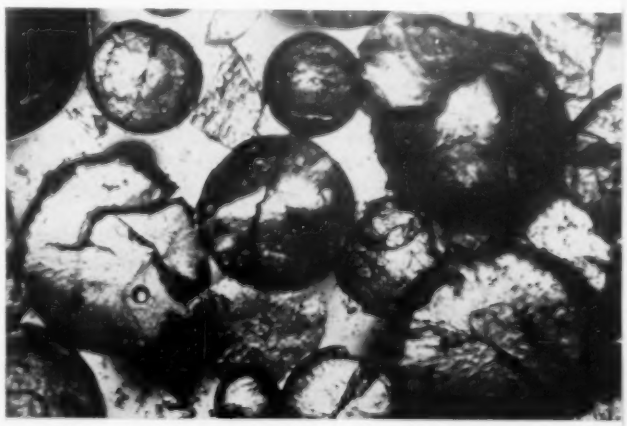
Nickel has been successfully recovered from plating wastes and rinses. A number of other applications such as recovery of silver, gold, copper, etc., have been discussed. It is not the purpose of this article to review ion exchange applications in the plating industry. For this the reader is referred to a number of excellent papers in the literature, a few of which are listed at the end of this report [1-9].

Whether or not an ion exchange treatment is feasible in a given operation is usually dependent upon economic factors. The economics of many ion exchange processes for plating applications have been studied in detail. However, there are a great number of potential applications for which cost figures are not available. In such cases, exploratory laboratory work is necessary. Before undertaking such work, the experimenter must determine which of the various commercial exchangers is most likely to solve his problem and then he must narrow down his choice to those which will do the best job with the least cost. The purpose of this article is to describe the principal types of ion exchange products which are available with particular regard to their potential application in the treatment of various plating baths, raw waters and rinse waters.

Quite generally, when a plating processor has a problem which he believes can be solved by ion exchange, he will consult an engineering firm which specializes in this field before attempting a commercial installation. This is considered a wise practice since there are a number of such organizations in this country whose experience over the past decade enables them to design complete units having predictable performance. Many also maintain active laboratories and are able to handle special and unusual situations which may arise.

The solution of problems in the plating industry by ion exchange is frequently preceded by the answering of numerous questions. If the work is of a preliminary nature or if it involves a brand new application, some of these questions can be answered in the plater's laboratory; if the application has reached the design stage, the answer can be obtained by consultation with a qualified engineering firm.

Cation Exchange resin, 8 per cent crosslinked styrene divinylbenzene, after 75 exchange cylces of undiluted chrome plating solutions. Capacity of resin as pictured was 1.50 equivilants/liter. 50X



*Associate Technical Director, Chemical Process Co., Calif.

If the decision is to carry out exploratory work, the experimental arrangement is extremely simple. Ion exchange columns can be set up with a minimum of effort using standard glass tubing, "Tygon" or rubber tubing and rubber stoppers. Or a standard, ready-made apparatus, such as is shown in figure 1, may be purchased for a nominal cost.

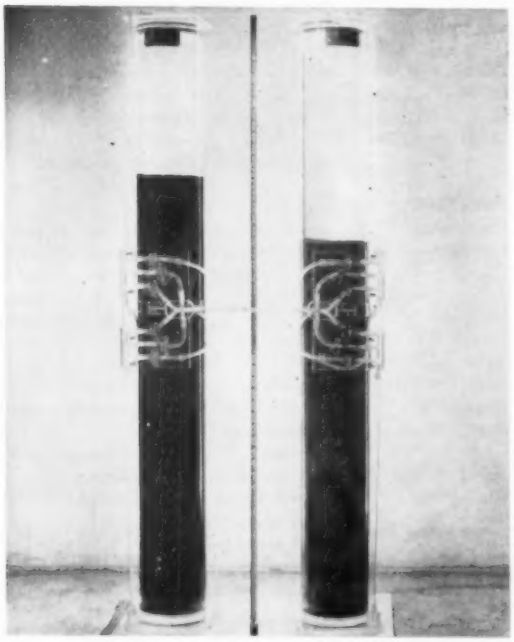


Figure 1: Plastic Demineralization Unit for Laboratory Work

DEFINITION AND CLASSIFICATION OF ION EXCHANGERS

The choice of an ion exchange resin for a given application requires a knowledge of the chemistry of the solution and some acquaintance with the composition and function of the resins. We are concerned here with the latter.

An ion exchange resin is simply an infusible, insoluble plastic in granular (or bead) form having chemically attached groups which dissociate in aqueous solutions. The number of such groups per unit volume (or weight) determines the exchange capacity. The chemical nature of the groups primarily determine the chemical function of the exchanger and, in some cases, its usable life. Matrix stability depends upon the nature of the underlying plastic structure or composition.

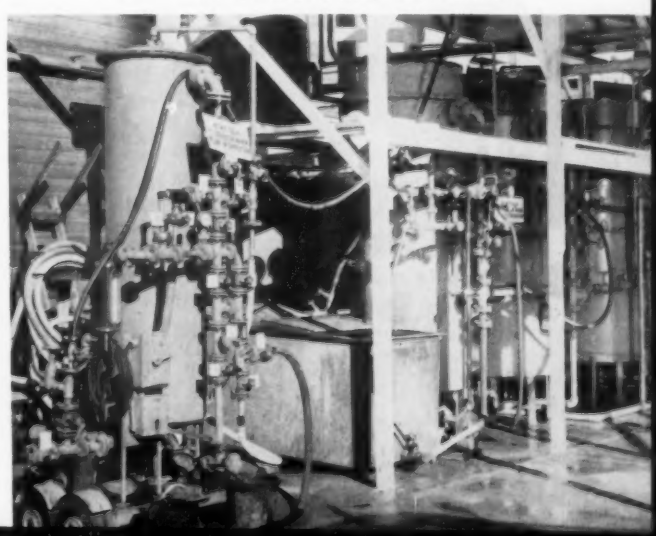
In the early days (1940–1946) the choice of an ion exchange resin was a simple matter. There was only one type of cation exchanger (strong acid) and one type of anion exchanger (weak base) available. By the same token, the number of applications was quite limited. However, the development of new resins during the past ten years has been rapid. The industry seems to be reaching the end of its adolescent period. The author's company alone manufactures 24 different and distinct ion exchange products which are commercially available. It is no wonder that the novice coming into the field may be confused and frequently goes astray because of the improper choice of resin.

Today the same simple classification into cation and anion exchangers still exists. The cation exchangers have groups which are negatively charged and the anion exchangers have groups which are positively charged upon dissociation in aqueous media. Further classification is determined by the degree to which these exchangers dissociate or ionize. They are classified as follows:

Cation Exchange resin, 8 per cent crosslinked styrene divinylbenzene, after 75 exchange cycles of undiluted chrome plating solutions. Capacity of resin as pictured was 1.50 equivilants/liter. 50X

Eight cubic foot cation exchange bed, used for experimental purification of undiluted chrome plating solutions

Air Force Photographs McClellan Air Force Base



I. **Cation Exchangers**
   - A. Strong Acid (sulfonic acid type)
   - B. Intermediate Acid (phosphonic acid type)
   - C. Weak Acid (carboxylic acid type)

II. **Anion Exchangers**
   - A. Strong Base (quaternary ammonium type)
   - B. Intermediate Base (mixed amine type)
   - C. Weak Base (tertiary, secondary, primary amine type)

In Table I, a number of the ion exchangers manufactured in this country are categorized in accordance with the above classification. The listing is not intended to be a complete one, either with regard to the number of resins manufactured or to their description. However, it can be used as a guide in making initial selections of products to be tried for a given application and it may be helpful in correlating trade names with chemical function. Only the trade names of U. S. manufacturers have been mentioned; it should be pointed out that various ion exchange engineering and equipment firms have their company designations for these same products.

TABLE I: CLASSIFICATION OF VARIOUS COMMERCIAL ION EXCHANGERS ACCORDING TO CHEMICAL FUNCTION

Trade Name	Matrix	Active Groups
Cation Exchangers:		
Strong Acid:		
Duolite C-20	Hydrocarbon	Ar—SO_3Na
Duolite C-25	Hydrocarbon-Porous	Ar—SO_3Na
Amberlite IR-120	Hydrocarbon	Ar—SO_3Na
Nalcite HCR	Hydrocarbon	Ar—SO_3Na
Dowex 50	Hydrocarbon	Ar—SO_3Na
Permutit Q	Hydrocarbon	Ar—SO_3Na
Duolite C-3	Phenolic	—CH_2SO_3H
Duolite C-10	Phenolic-Porous	—CH_2SO_3H
Intermediate Acid:		
Duolite C-62	Hydrocarbon-Porous	Ar—PO_2H_2
Duolite C-63	Hydrocarbon-Porous	Ar—$P(O)(OH)_2$
Nalcite X-219	Hydrocarbon	Ar—$P(O)(OH)_2$
Permutit XP	Hydrocarbon	Ar—$P(O)(OH)_2$
Weak Acid:		
Duolite CS-101	Aliphatic	—COOH
Amberlite IRC-50	Aliphatic	—COOH
Permutit H-70	Aliphatic	—COOH
Duolite CS-100	Phenolic	Ar—OH and —COOH
Anion Exchangers:		
Strong Base:		
Duolite A-42	Hydrocarbon	—$N(CH_3)_2Cl$
Amberlite IRA-400	Hydrocarbon	—$N(CH_3)_2Cl$
Nalcite SBR	Hydrocarbon	—$N(CH_3)_2Cl$
Permutit S-1	Hydrocarbon	—$N(CH_3)_2Cl$
Duolite A-101	Hydrocarbon-Porous	—$N(CH_3)_2Cl$
Amberlite IRA-401	Hydrocarbon-Low X-linked	—$N(CH_3)_2Cl$
Duolite A-40	Hydrocarbon	—$N(CH_3)_2(C_2H_5OH)$ Cl
Amberlite IRA-410	Hydrocarbon	—$N(CH_3)_2(C_2H_5OH)$ Cl
Nalcite SAR	Hydrocarbon	—$N(CH_3)_2(C_2H_5OH)$ Cl
Permutit S-2	Hydrocarbon	—$N(CH_3)_2(C_2H_5OH)$ Cl
Duolite A-102	Hydrocarbon-Porous	—$N(CH_3)_2(C_2H_5OH)$ Cl
Amberlite IRA-411*	Hydrocarbon-Low X-linked	—$N(CH_3)_2(C_2H_5OH)$ Cl
Intermediate Base:		
Duolite A-30	Aliphatic Amine	Tertiary-quaternary amine
Duolite A-41	Aliphatic Amine	Tertiary-quaternary amine
Duolite A-43	Aliphatic Amine	Tertiary-quaternary amine
Ionac A-300	Aliphatic Amine	Tertiary-quaternary amine
Permutit A	Aliphatic Amine	Tertiary-quaternary amine
Weak Base:		
Duolite A-2	Phenolic-porous	Secondary-tertiary amine
Duolite A-4	Phenolic-porous	Secondary-tertiary amine
Duolite A-7	Phenolic-porous	Secondary-tertiary amine
Amberlite IR-4B	Phenolic	Secondary-tertiary amine
De-Acidite	Condensate	Secondary-tertiary amine
Duolite A-14	Hydrocarbon	Primary-secondary amine
Amberlite IR-45	Hydrocarbon	Primary-secondary amine
Nalcite WBR	Hydrocarbon	Primary-secondary amine
Permutit W	Hydrocarbon	Primary-secondary amine
Duolite A-114	Hydrocarbon-Porous	Primary-secondary amine
Duolite A-2M	Phenolic-Porous	Tertiary amine
Duolite A-6	Phenolic-Porous	Tertiary amine

*Discontinued June, 1956.

IMPORTANT FEATURES OF VARIOUS RESINS

There are two ways in which the important factors influencing the choice of resins may be discussed. One is to point out the salient features of each of the types of resins given in Table I; and the other involves a consideration of specific applications with relation to the resins which can be used. Since this article is intended to be general rather than specific, the former method will be emphasized.

Cation Exchangers

Strong Acid Types

The crosslinked polystyrene sulfonic acid type cation exchanger is the "workhorse" of the entire ion exchange industry. It is used most frequently in water softening, both domestic and industrial. As a result of its volume consumption and moderate production cost, the price of this product is relatively low in comparison with other ion exchange products.

The polystyrene strong acid type exchanger is generally the first one considered whenever a metallic cation is to be removed, recovered or concentrated. It possesses many virtues such as high exchange capacity, good hydraulic characteristics and a high degree of physical and chemical stability. As is the case so frequently, these descriptive terms are again relative, especially with regard to chemical stability.

For example, the polystyrene matrix is less subject to oxidative degradation than the phenolic matrix. In treating chlorine-containing waters, Duolite C-20 will remain

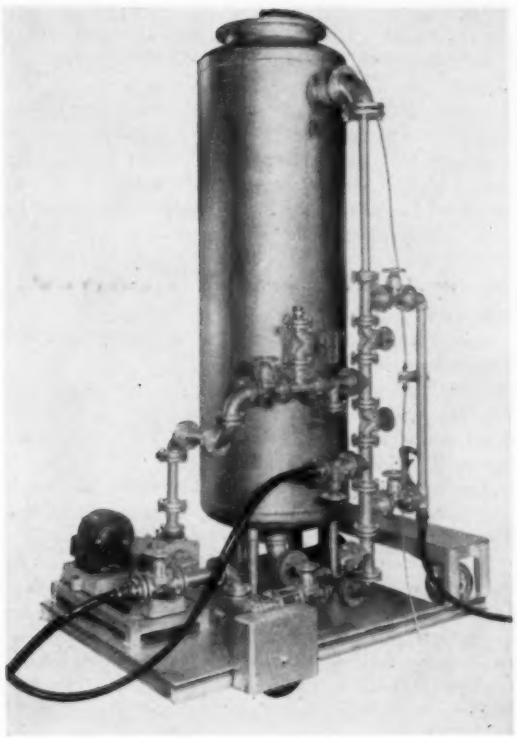


Photo Courtesy Ill. Water Treatment Co., Rockford, Ill.
Portable Chrome Purifier

in service long after Duolite C-3 has swelled and lost considerable capacity. Yet the polystyrene cation exchangers are not completely free from oxidative effects. In treating concentrated chrome plating baths (containing 300 to 400 g/l of CrO_3) for the removal of contaminating cations such as Cr^{+++}, Fe^{+++} and Ni^{++}, the ordinary polystyrene exchangers undergo oxidative degradation at a relatively rapid rate. These undesirable effects have been mitigated by (a) reducing the contact time between the chromic acid bath and the resin, (b) diluting the concentration and acidity of the bath and (c) modifying the composition of the exchanger to render it less subject to degradation.

Although the phenolic resins (such as Duolite C-3 and C-10) are used less frequently than their polystyrene counterparts, these resins are useful in non-oxidative applications because of their high exchange efficiency, good adsorptive properties and relatively low regenerant requirement.

Intermediate Acid Type

At the present time, these resins may be considered as specialty or even experimental products. Their production has not been large and very little is known about their chemical behavior.

The only products of this type at present are the phosphonous (Duolite C-62) and phosphonic (e.g., Duolite C-63) acid exchangers. A phosphoric acid resin (Duolite ES-65) has been produced in laboratory quantities. As indicated, the acidity of these groups lies somewhere between that of the strongly acidic sulfonic acid and the weakly acidic carboxylic acid.

Although not current among the better known ion exchangers, the phosphorus-containing resins may well find increasing use in hydrometallurgical industries because of their specificity for certain polyvalent metallic cations. In a current pilot plant installation, copper is being efficiently recovered from a solution containing 300 mg/l of Cu and 40,000 mg/l of ammonium sulfate, the influent *p*H being 6.3 to 6.5. In this particular instance, a sulfonic acid exchanger offers neither specificity, physical stability, nor economy in regeneration; the weakly acid carboxylic exchanger does not adsorb quantitatively in the specified *p*H range. As other uses such as this one develop, the intermediate acid type cation exchanger may well come out of the specialty class.

Weak Acid Type

This type of resin is so classified because of its weakly ionized acid groups, generally carboxylic acid groups.

Although these resins are employed primarily for the purification and recovery of organic constituents, they do hold some promise for the specific recovery of multivalent metallic cations. Certainly for the recovery of copper or nickel from an aqueous mixture in a new, unexplored application, the use of a carboxylic exchanger should be considered.

One of the factors which may discourage widespread general use of the carboxylic exchangers is the fact that their cost is higher than that of the sulfonic exchangers. Thus their use will be limited to specialized applications in which the more popular strong acid resin cannot be employed.

Anion Exchangers

Strong Base Type

The strong base anion exchangers, characterized by their content of quaternary ammonium groups, have achieved widespread use in recent years for the complete demineralization of water and for the recovery of uranium from acid-leached ores. They may be sub-classified into Type I, having tri-alkyl ammonium groups, and Type II, having di-alkyl alkanol ammonium groups. The Type I is characterized by its somewhat greater basicity and higher degree of chemical stability.

When a strong base anion exchanger is indicated for a given application, there are a number of factors which must be considered before a choice can be made. From the viewpoint of chemical function, ordinarily either Type I or II can be employed. The choice between the two is generally determined by economic factors. Although the prices are about the same, one must consider the amount of regenerant required for a given amount of exchange reaction and the projected service life of the exchanger. Both could be major factors in the cost evaluation of an ion exchange unit.

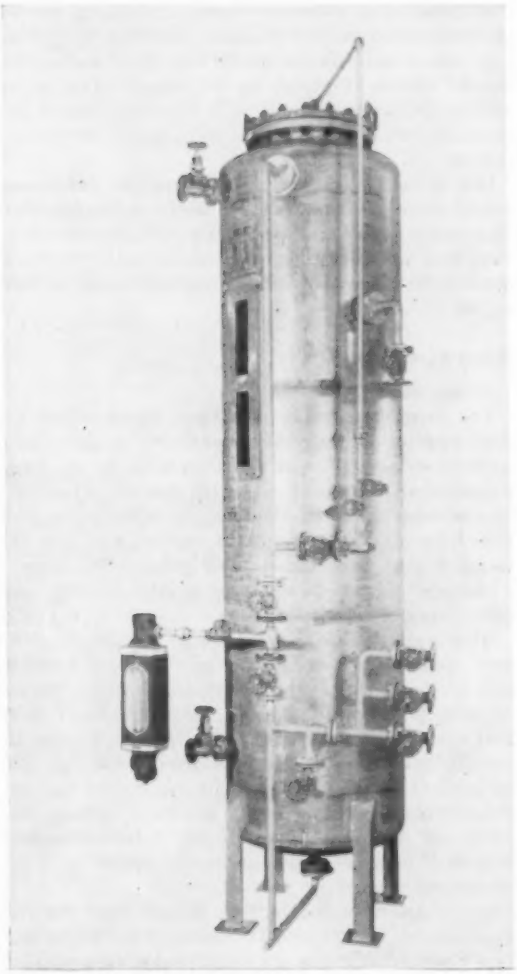
In very general terms, the Type II quaternary requires somewhat less caustic soda for regeneration whereas the Type I resin is likely to give a longer service life, especially when the operating temperature of the solution being treated is above room temperature. The instability of the

quaternary group is a factor, however, only when it is employed in the hydroxyl cycle. When only salt exchange, say chloride for sulfate, is involved, the service life becomes an insignificant factor. If the operating conditions are mild (low temperature, non-oxidative media) then the preference may go to the Type II.

A factor which is usually minor but may in some cases be major involves the leakage requirement. Usually in plating applications, leakages of the order of 0.2 ppm or less are hardly significant. In those few instances where zero or near-zero leakages are required, the stronger base Type I resin is preferred.

Intermediate Base Type

The term "intermediate base" as applied to anion exchangers may actually be a misnomer, composition-wise, since they derive their activity from a mixture of weakly and strongly basic groups. However, their behavior appears to be intermediate between those of the weak base and strong base exchangers.



Special Stainless Steel cation exchanger for recovery of metal finishing acid

The intermediate base resins have not found extensive use as yet in the plating industry. Such applications have been restricted to raw water treatment. However, because of their difunctionality, these resins might well find use where up to now only strong base resins have been considered. In water treatment, they are effective in removing not only the strong acids but the very weakly ionized acids as well. Their aliphatic matrix renders them somewhat less susceptible to certain types of chemical attack. The lower cost of these resins has been an attraction in other ion exchange applications and may well cause them to be seriously considered for plating operations.

Weak Base Type

Greater variation in composition is possible with the weak base exchangers than with any other type. This is the case because of the various combinations of primary, secondary and tertiary amine groups which can be introduced during the manufacturing operation. With other factors, this results in a somewhat lower priced resin.

Here again, there has been very little use of the weak base resins in the plating industry. To some extent this is due to the fact that these exchangers are unable to split neutral salts or to remove very weakly ionized acids. In applications involving anion exchangers, the weak base resin should not be dropped from consideration. There may be applications in which process temperature requirements eliminate the possible use of a strong base exchanger in which the weak base could be employed to advantage; lower replacement costs are also attractive.

POROSITY IN ION EXCHANGERS

Table I lists 11 exchangers whose matrix is described as being "porous." The necessity for considering this property is becoming increasingly important.

In ion exchange applications the ions being exchanged must diffuse into the interior of the resin particles in order to utilize their full capacity and they must be able to diffuse out when being replaced by the regenerating agent. Thus, when the ion being exchanged is a large one and the pores of the exchanger are small, the result is a decrease in the exchange capacity with eventual "fouling" of the resin.

Highly porous phenolic exchangers have been available for many years. More recently, the porosity of strong acid and strong base polystyrene exchangers were made available by decreasing the cross-linking of the styrene matrix. However, this technique resulted in weakened physical structures and these products are gradually being abandoned. Most recently, new techniques were developed in the author's laboratory by which truly porous polystyrene matrices were made without loss in strength. These products are now commercially available as Duolite C-25, a strong acid cation exchanger, Duolite A-101 and A-102, Type I and Type II strong base anion exchangers, respectively, and Duolite A-114, a weak base anion exchanger.

In treating waters containing organic matter (which can arise from pollution or from decaying fish life or vegetable matter) or high molecular weight forms of silica, it becomes imperative to use porous ion exchange resins. A further advantage resulting from their use is the higher flow rates which they permit.

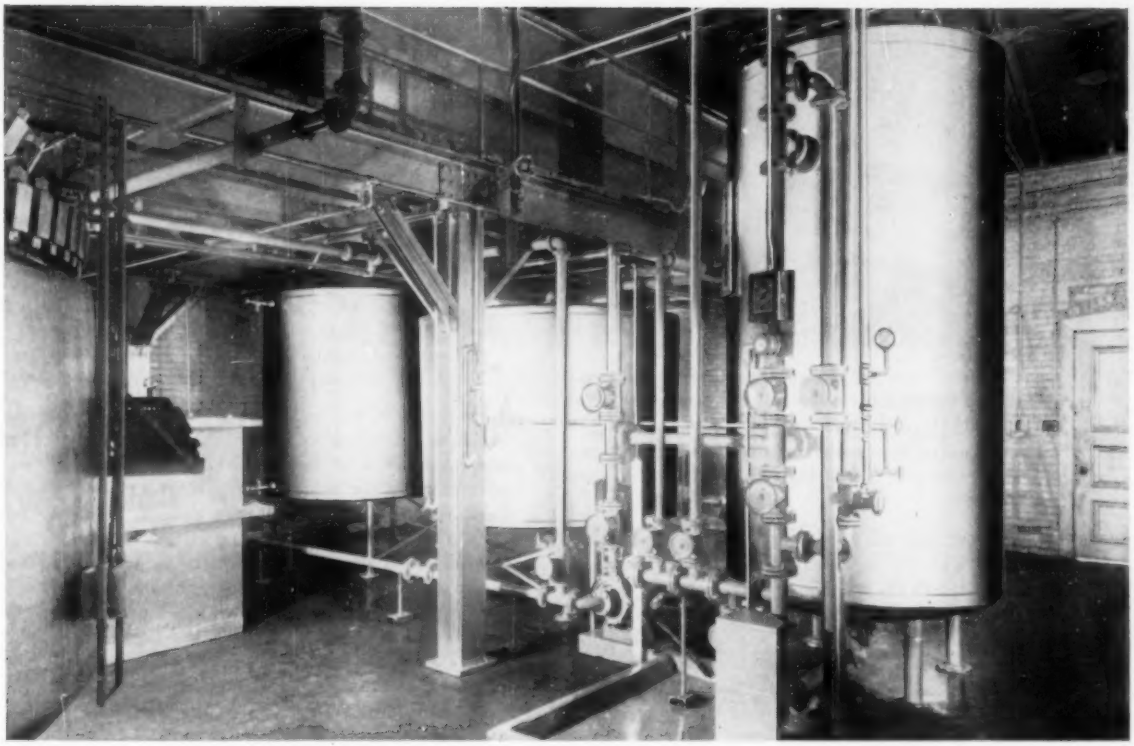


Photo Courtesy Illinois Water Treatment Co., Rockford, Ill.

Chromic Acid recovery system in midwestern defense plant

SUMMARY

In seeking a solution to any problem, the researcher first defines the problem, then digs up the known facts (usually by a literature search), then proceeds to uncover unknown facts (by experimentation), then reaches conclusions, and finally, on the basis of his findings, he carries out the measures required for the solution to the problem.

This general procedure is certainly applicable to problems faced in the plating industry. If poor results in the nature of scums, films, discolorations, rough spots, etc., are encountered, the raw water is a likely culprit. Water softening or water demineralization may be the answer. Exchangers to be used in such applications are usually the standard ones, quite well known to firms specializing in water-treating equipment. Problem waters containing unusual constituents or extraordinarily high concentrations of certain ingredients may require special consideration and special resins.

Where an existing problem has been solved by a standard ion exchange technique, no additional laboratory work need be undertaken. Where no such previous experience exists, a minimum amount of laboratory work may easily simplify a design, eliminate excessive costs and save considerable time. In carrying out such work, choice of the proper ion exchange resin should be given ample consideration.

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[3]Gilbert L., Morrison, W. S., and Kahler, F. H., Proc. Am. Electroplaters' Soc., **39,** 31 (1952).

[4]Keating, R. J., Dvorin, R., and Calise, V. J., Ninth Industrial Waste Conference, Purdue University, Lafayette, Indiana, (May 11, 1954).

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[6]McGarvey, F. X., Tenhoor, R. E., and Nevers, R. P., Ind. Eng. Chem., **44,** 534 (1952).

[7]Tooper, E. B., Plating, **42,** 1416 (1955).

[8]Walker, C. A., and Zabban, W., Plating, **40,** 269 (1953).

Dr. I. M. Abrams was born in St. Paul, Minn. He spent his undergraduate years at the U. of Minnesota and received a BCh in 1938. In 1942, he earned a PhD at the same institution. Since 1947, he has been with the Chemical Process Company in Redwood City, Calif. Since the beginning of the year, he has been Associate Technical Director with his company.

Photo courtesy of Filtration Engineers, Inc.

Filtration Engineers, Inc., rotary vacuum pilot plant filter with string discharge. This type of filter has been designed specially to permit scale-up to production sized equipment. Pilot Plant Filter which can handle up to 50,000 gallons of waste per day

PRECIPITATION AND FILTERATION

A PRACTICAL SOLUTION TO YOUR PLATING WASTE DISPOSAL PROBLEM

by Harold M. Small and Walter C. Graulicht

If your plant happens to be located in a thinly populated area next to a river going nowhere in particular, you won't be concerned with the problem of efficient waste disposal . . . for at least five years. Enjoy those five years while you can. With the population of this country continuing to shift and expand with great rapidity, chances are extremely good that by that time your isolated area will be isolated no longer and you'll be joining the large army of firms being prodded by the constricting community to do something more than just dump your plating wastes wherever it is most convenient.

When the state or municipal authorities demand action, your first concern will be how the wastes can be disposed of most efficiently and economically, and in this regard many have been penny wise, pound foolish in seeking rapid or seemingly inexpensive short-term solutions without regard for the long pull. Almost invariably, growth of the company increases the volume, and often, also, the diverse nature of the noxious wastes that must be dealt with. Growth of the industrial community brings into being pollution problems outside the control of any specific company, and growth of the community which crowds in on the industries brings strident demands for more regulation and stricter anti-pollution standards. Obviously, a short range solution to a pollution problem is but temporizing and eventually the number of short range steps that must be taken to satisfy immediate demands can become very costly in time, effort and monies expended.

NATURE OF THE WASTES

Generally plating wastes, rich in cyanides and heavy metal salts, are highly toxic. In addition, the cyanides in their gradual oxidation to relatively non-toxic cyanates consume much dissolved oxygen and so have a high biological oxygen demand (BOD) and, thus, lead to extensive destruction of aquatic-life.

†Vice-President and Sales Engineer, respectively, Filtration Engineers, Inc., Newark, New Jersey.

LAGOONING

Short of dumping the wastes into a river or lake or sending them to a municipal treatment plant, the construction of a lagoon offers the most facile disposal, but with the disadvantages of the requirement of large areas and limited disposal capacities. Evaporation leads to the deposition of salts which build up and need periodic removal in the form of solids and sludges or the construction of a new lagoon if space permits. Also seepage leads to the gradual pollution of the area and streams which arise in or make contact with the area. For this reason lagoons are generally unacceptable to authorities even when located totally on one's own property. This property itself may acquire increased value as the area becomes more heavily populated and the presence of the lagoon prohibits either its sale for profit or plant expansion, unless, of course, one goes to the expense of draining and filling the land.

ION-EXCHANGE

The newer ion-exchange resin recovery and disposal systems provide means for continuous reclamation of anions, cations, or both, as values dictate. However, the relatively high cost of these systems limits their scope to the recovery of relatively valuable constituents, such as chromium and nickel. Liquid feed to ion-exchangers must be carefully filtered from oil and suspended solids to avoid destruction of the exchange resin. Frequently overlooked when ion-exchange systems are contemplated is the fact that the reactivation phase itself produces an appreciable volume of waste. Ion exchange is mentioned here because in the recovery of valuable constituents it may sometimes be regarded as part of a disposal system. Actually, however, its function is broader and generally its presence in a waste disposal system is incidental to the economics of the recovery of specific constituents.

The wide diversity in the character, state of dilution and irregularity of discharge of plating wastes are such that the most practical overall approach to their disposal is an economical method by which the large volume of dilute wastes may be concentrated to smaller and more manageable bodies while at the same time yielding a large volume of relatively non-toxic water suitable for industry re-use or safe discharge into a public stream. If the water or valuable constituents can be re-used, it should result in a credit which reduces the cost of the waste disposal operation.

PRECIPITATION AND FILTRATION

In the long run, precipitation, thickening and filtration are the most satisfactory means of waste disposal. Generally they produce aqueous discharge acceptable to authorities, and the equipment can be operated with a minimum of labor and cost of upkeep. Savings in manpower and maintenance can amortize the cost of the initial investment in a reasonably short time. But the chemical cost of detoxification and neutralization must be considered in evaluating the economics of this solution.

PRECAUTIONS ARE NECESSARY

The plating plant waste discharge coming from expended cleaning solutions and metallic plating baths and rinses are generally manifolded from numerous sources and operations. Care should be exercised in the discharge of acidic wastes in order to prevent the sudden release of toxic hydrogen cyanide from plating bath solutions.

A typical plating operation from a moderate sized unit would discharge about 100,000 gallons of waste per day. Normally, it is more efficient to treat separately wastes coming from metal pretreating and subsequent polishing which may contain oils or greases. Such wastes are usually handled by passing the liquids with a minimum of turbulence beneath baffles, or by the use of flotation techniques. Also, cyanide wastes must be chemically oxidized to cyanates, usually with chlorine or hypochlorites. In order to conserve on the costs of the chemicals involved and to make the operation manageable, it is obvious this treatment is best carried out only on that portion of the waste requiring it, rather than on the entire body of mixed and diluted wastes.

Finally metal constituents are precipitated by the introduction of alkaline agents, or alkaline wastes if available. Slurry of lime is the cheapest chemical agent if needed in large quantities, although the convenience of using caustic soda may make it preferable if the requirements for it are not large. Metal precipitation is usually complete enough in the absence of cyanides if the *p*H exceeds about 12.5. Usually this precipitate, separating as it does in the presence of colloidal plating additives, is a slime which is slow to settle and difficult to filter. If the volume of such suspension is large, the most practicable means for separating the precipitated material is via conventional settling basins or thickeners. The clear, aqueous effluent from the thickener, if low in dissolved matter, may be re-used or discharged. If discharged, the *p*H should be adjusted to as near neutrality as possible. By such means, approximately 99,000 gallons of clear overflow per day may be discharged to the river, leaving a concentrated mass of perhaps 1000 gallons of sludge containing approximately 4 per cent suspended matter. Thus the sludge usually constitutes about 1 per cent or less of the original wastes and becomes manageable, particularly for a final filtration operation.

For a smaller plating plant where it is desired to avoid the construction of settling basins or thickeners, the whole body of precipitated liquid may be handled through a continuous vacuum precoat filter, or the slime may be made more readily filterable by the addition of low density, bulky materials such as sawdust, fly-ash and the like. The solid cake, so obtained, is readily handled for conveyance to a solids dump, or if the metal values warrant their recovery, another credit for the disposal operation may be secured.

FILTERING SLUDGE

Returning to the 1000 gallons of approximately 4 per cent sludge obtained in the example above, the solid matter, while widely variable from plant to plant and operation to operation, consists essentially of sulfates, hydroxides and cyanates. Handling this material via lagoons is impractical since the sludge generally does not drain. However, the filtration of approximately 1000 gallons of sludge on a continuous vacuum string filter is eminently practical and provides a relatively low cost, secure method for reducing this material to a small area of disposable solids which represent, perhaps, a maximum of 10 per cent of the feed sludge, and a filtrate suitable for river discharge.

Experience with actual plant-sized installations handling specific sludges, together with considerable pilot plant work, has shown that the string discharge type of continuous vacuum filter will handle a wider range of sludges than will the conventional scraper discharge type. The thin, slimy or sticky cake is lifted cleanly from the filter medium without blinding the cloth due to the smearing effect of the discharge blade. Blinding is further minimized by using thinner, more efficient filter cloths which cannot be used on scraper filters. The clear filtrate can be pumped directly to the sewer, or, as most plants prefer, may be returned to the head of the treatment process, so that all discharged effluents leave the system through the thickeners. In any case, the manner of discharge of the clear filtrate is not important, since it represents less than 1 per cent of the total waste fluids.

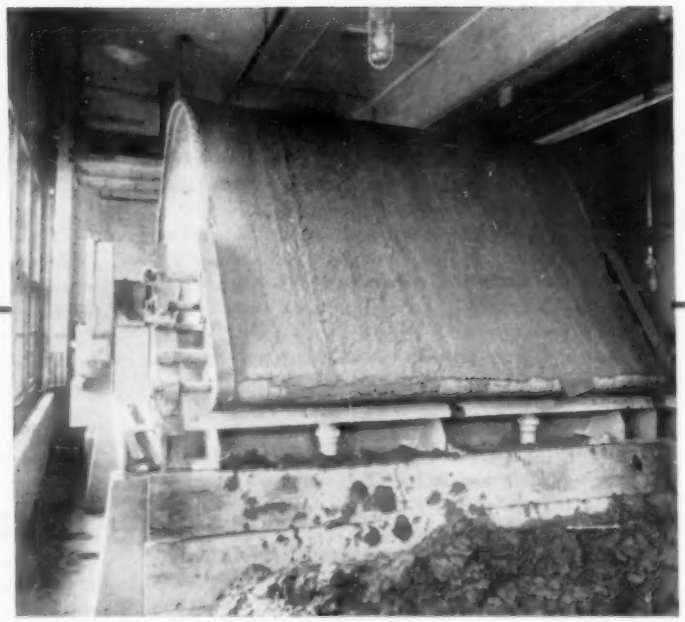
FILTER SIZE

Selecting the proper size of the vacuum filter presents a problem which should be solved by a combination of pilot plant tests and dependence on the broad experience of the filter manufacturer, since the many variables present are difficult to isolate and appraise. Each installation must be engineered on an individual basis. Obviously, the size of the filter will depend upon the volume of liquids or sludge to be processed continuously, with peak and trough volumes being averaged by discharge to a feed surge tank. But the character of the precipitated slimes has an enormous influence on the filterability of the material, and that in turn depends upon the presence of colloids which prevent the formation of large particle precipitates. Many variables can only be appraised in the selection of the filter on the basis of filter experience, backed by pilot and laboratory tests. The counsel of the filter manufacturer in working out the process-steps in disposal operation may lead to suggestions resulting in sludges which are relatively easy to filter. Recently there has been developed a number of polyelectrolytes, commonly referred to as flocculating agents, which function efficiently as coagulants in very low concentrations. The

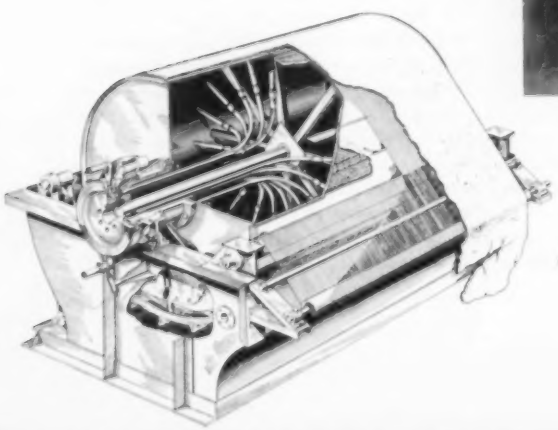
Disposable filter cake waste. Wastes are filtered through continuous, rotary vacuum filter with string discharge, separating the solid portion of the sludge as an easily disposable cake while the filtrate can be dumped safely. String discharge lifts the material from the filter without blinding the filter cloth. Note imprint of strings on the cake

Photo courtesy of Filtration Engineers, Inc.

50 Per cent Submergence filter used to recover soluble iron and zinc salts. Cake is waste mud



Rotary Vacuum filter of the type used to handle plating wastes



Cutaway view of rotary vacuum filter with string discharge

judicious use of these, as well as filter aids, may change relatively unmanageable slimes to readily handled fluids.

In actual practice on concentrated waste sludges, filtration rates have varied widely from 30 pounds to as low as 1.5 pounds of dry solids per hour per square foot of filter area. This means that even for the typical example used in this review, involving 1000 gallons of sludge, an estimate of filter size may be in error by a factor of 20. Experience and pilot plant tests thus play a vital role in walking the tight-rope between specifying a filter closely adequate to a variable volume with, perhaps, a variable character, and calling for a large filter with a large factor of safety but thus loading the operation with an excessive capital requirement. To ensure that the size and type of filter specified is proper, pilot tests should extend over a long enough period to take into account the many fluctuating variables that may be present.

Recently the authors' company made an installation at one of the larger manufacturing plants in the country. The following are some of the notes taken at the time tests were being run to determine specifications of the filtration equipment needed, and they've been included here to show the factors involved before selecting equipment.

"Plant flow is 2,500,000 gal/day of combined waste water which will yield about 25,000 gallons of sludge at approximately 3.5 per cent solids. It is desired to process the sludge in a 16-hour day with one filter to operate on this basis and a second as a standby which would permit operation on an 8-hour day if necessary.

"Set up a 3 foot diameter x 1 foot face string discharge pilot plant rotary vacuum filter which provides 9.4 square feet of filtering area."

(Note: This type of filter was designed specifically for pilot tests and is widely employed to secure information that can be scaled up directly to plant sized equipment. However, in some of the smaller plating waste disposal operations, this filter may serve as the operational unit.)

"A 300 gallon sample of sludge at a temperature of 70° F and a *p*H of 10 was secured. Running the filter at a drum speed of 1/8 rpm, a continuous 5/32 inch cake containing approximately 80 per cent moisture was discharged cleanly from the filter with a filtering rate of 2.1 pounds of dry solids per hour per square foot of filtering area. Filtrate was clear, odorless and was discharged to stream.

"Filter was run for six days during which time the effect of variations in solids concentration, *p*H, temperature and other variables were studied. As a result of these studies, for the processing of 25,000 gallons of sludge per 16 hour day, a filter with 340 square feet of filtering area was recommended."

EQUIPMENT

Normally mild steel and cast iron construction in the filter and accessory equipment is adequate, especially if the *p*H of the fluids being processed is maintained well above 7. Accessory equipment required includes a vacuum pump, usually of the rotary type, vacuum receiver, filtrate pump, sludge pump, filter cake removal conveyor, together with suitable electric motor drives.

COSTS

Cost of filtering equipment obviously is dependent upon the size and materials of construction, but to give some order of magnitude figure for comparison purposes, let us consider the cost of equipment to handle 1000 gallons of a slow-filtering, 4 per cent solids sludge per 8 hour day. Assuming difficult conditions, a filtering rate of 2 pounds dry solids per square foot per hour, a total filter area of 28 square feet would allow for a 30 per cent safety factor. The installed cost of this filter, complete with all accessory equipment would approximate $10,000. Operating costs include the use of 8 horsepower, approximately $100/year for cloth, string and miscellaneous spare parts and approximately 1/4 of an operator's time. (These figures do not include the costs of pretreatment equipment which can run several times that of the filter.)

As the filter size increases, the installed and operating costs per square foot decrease sharply. For example, an installation of five times the above-indicated size, i.e. 140 sq ft, may cost only 70 per cent additional.

SUMMARY

Since the expanding and shifting population of this country is moving into many new areas, disposal of plating wastes in accordance with municipal or state restrictions is becoming an ever-increasing problem.

A practical and economical solution is the installation of precipitation and filtration equipment which generally satisfies state restrictions and is inexpensive to operate and maintain.

It must be kept in mind, however, that before equipment is specified, pilot plant studies and laboratory tests must be made in order to realize the soundest economies and most efficient operation, since waste in every plating plant varies in character, state of dilution and regularity of discharge. Properly designed and operated, continuous vacuum filtering equipment is foolproof to operate and maintain with unskilled plant personnel.

Harold Small was born in Springfield, Massachusetts, in 1915, and is a graduate of Northeastern University in Boston, obtaining his BS degree in Chemical Engineering in 1939. He joined Filtration Engineers, Inc., in 1940 and now holds the position of Vice-President and General Sales Manager.

Small

Graulich

Walter C. Graulich, born in Jersey City, New Jersey, in 1923, attended Stevens Institute, Hoboken, then spent 3½ years in the Navy during World War II, and returned to Stevens to complete work for a bachelor's degree, which he received in 1948. Graulich became associated with Filtration Engineers, Inc., at that time as a Development Engineer. In 1950 he assumed his current duties as a Sales Engineer.

PROFITABLE RECOVERY OF PLATING WASTES BY RECONCENTRATION OF REDUCED VOLUME RINSES

By K. Odland* and J. C. Hesler*

ABSTRACT

The cost of treating toxic wastes resulting from plating and related metal finishing operations has resulted in determined efforts to reduce the expense of those nonproductive operations. Plating wastes treatment has progressed from indiscriminate and costly processing of mixed wastes to the application of reconcentration procedures on segregated wastes capable, in many instances, of converting former treatment costs to recovery profits.

A recent development in the search to reduce costs is described in this paper; reduced rinse flows resulting from efficient counter-current rinsing practice now make feasible the application of evaporation equipment for complete recovery of drag-out losses, thereby eliminating destruction costs, and reclaiming valuable metals. Applications of this technique to the recovery of metallic cyanides and chromic acid from rinse waters are illustrated, with tables, to permit comparison with destruction methods now in use.

REVIEW OF PAST PROCEDURES

Procedures for the treatment of the varied chemical wastes resulting from plating and related finishing operations have been continuously improved during the last ten years. In 1945, when waste treatment control laws first were instituted, most plating plants required to treat their discharges assumed that the entire waste flow would be handled by one treatment plant, regardless of its complex nature.

Metallic cyanides, chromic acid and chromates, acids, alkalis, detergents and sometimes oils would be indiscriminately mixed and sent to the "treatment" plant. As a result, designers were forced to destroy cyanides by oxidation with chlorine in the presence of another oxidant, chromates, and then to reduce the chromates by suitable reductants in the presence of excess oxidant, chlorine, thereby consuming excessive amounts of treating chemicals.

Further, the *p*H of the mixed waste was usually acid, requiring addition of external alkali to bring about a favorably high *p*H for cyanide destruction, then necessitating lowering to an acid value to permit rapid chromate reduction, and finally re-alkalizing to meet the *p*H limitation for sewer discharge.

Reduction of chromates before oxidation of cyanide in order to take advantage of the acid environment was impractical, as the subsequent cyanide oxidation step reconverted some of the trivalent chromium to the toxic hexavalent stage.

Organic detergents from cleaners consumed much of the chlorine intended for cyanide destruction, increasing utilization of an expensive treating chemical.

As a result of experience gained in the first few treatment plants, attention was focussed on means of reducing the disposal costs of plating wastes[1]; segregation of noncompatible wastes was practiced,[2] permitting destruction of cyanides without interference by chromates, reduction and precipitation of chromates without interference by cyanides, etc. Intensive preliminary studies on each waste discharge revealed that many non-toxic rinses from dilute acid or alkaline cleaners and picklers could by-pass the treatment plant and be discharged directly to the sewer or receiving stream with self-neutralization occurring immediately. The added cost of separate receiving lines into weak acid-alkali receptors, cyanide receptors and chrome receptors was quickly recovered by reductions in the quantities of expensive treating chemicals.

ION EXCHANGE RECOVERY PROCEDURES

The success of the segregated wastes plant, with overall reduction in treatment costs, spurred further research in means of recovering some of the more valuable waste components; these embraced most of the cyanide baths of copper, cadmium, zinc and silver, and many chromium treating or plating solutions. Expensive wastes include not only those containing valuable chemicals, but also those which require extensive treatment to neutralize.

Costa[3] first disclosed the use of cation exchangers for the purification of chromic acid baths and other chromate bearing solutions, leading to practical recovery procedures for concentrated chromate baths[2, 4, 5] which avoid excessive destruction costs.

Recovery of chromic acid from dilute running rinses by demineralization equipment has also been proved practical[2, 6], with return to the plating bath of purified chromic acid formerly discharged in the running rinses, and recovery of high quality demineralized water for re-use in rinsing operations. These procedures permit "closed" systems and avoid entirely the problem of chromate reduction.

Despite many claims for successful applications of demineralization to cyanide rinse waters, such treatment has never proven practical; some cyanide complexes are not

*Water and Waste Treatment Div., Industrial Filter & Pump Mfg. Co. Chicago Ill.

Fig. 2 Chromium Recovery System

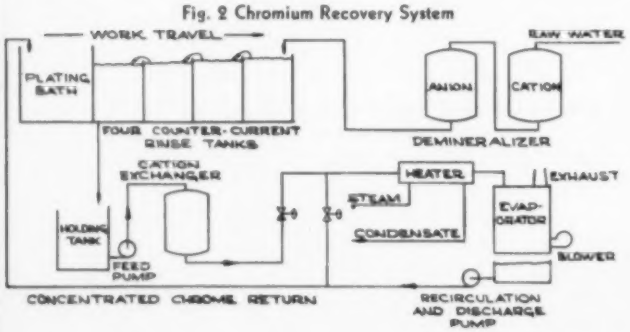
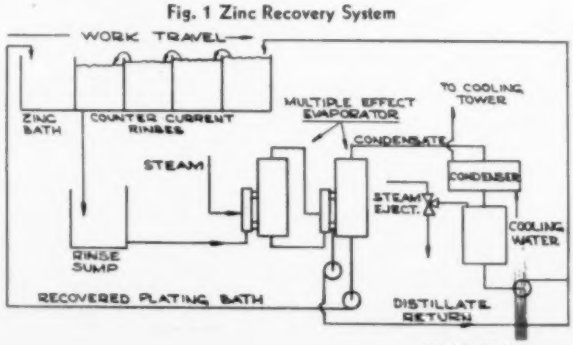


Fig. 1 Zinc Recovery System



decomposed by the acid-regenerated cation exchanger, so that they pass through the plant unchanged, and much of the hydrocyanic acid which is generated "leaks" through the anion exchanger because of its very weakly acidic nature. As a result, demineralization of cyanide rinses are practical only when the treated effluent is returned to cyanide plating rinse tanks. No completely successful mixed rinse water treatment has yet been applied.

The high costs of destroying cyanide and chromate rinse waters are well known; it requires a minimum of seven pounds of chlorine and seven pounds of caustic soda to treat one pound of cyanide ion as it appears in plating rinse waters, sodium cyanide dip solutions, etc. The minimum cost for destruction of one pound of cyanide is $1.10, and more frequently is $1.40 to $1.50, plus the cost of replacing metal, cyanide and caustic to the bath.

Chromates require a minimum of one pound of sulfur dioxide, the cheapest efficient reductant, together with one and one quarter pounds of lime for re-neutralization, for every pound of chromic acid. Minimum destruction costs are therefore $0.12/lb, plus the cost of replacing the chromic acid to the bath.

The complete unsuitability of ion exchange concentrators for cyanide solutions to permit recovery, coupled with the high cost of destruction and replacement—especially in the case of cadmium and copper cyanide baths—has renewed the search for more practical methods; it has long been recognized that evaporation of spent rinse waters—especially if other contaminants co-existing with toxic or valuable materials in such rinses can be removed—is a feasible recovery procedure. Evaporation of rinses permits a closed system in which no potentially toxic materials are discharged, eliminating the need for destruction plants, providing pure condensate for rinse re-use, and recovering valuable plating materials.

In the past, recovery by evaporation was not considered economically justified because of the large volumes of rinse water discharged and requiring subsequent concentration. Manufacturers of plating equipment carefully engineered cleaning, pickling and plating cycles, but seldom designed rinse tanks for economical use of water. Prior to enforcement of pollution laws, rinse rates were unimportant, water was generally inexpensive, and it was the sole responsibility of the machine operator to establish "good" rinsing. Invariably this resulted in "wide-open" rinses, discharging at from five to fifty times the rate required for properly rinsed plated ware.

Since restrictions were applied to indiscriminately discharged wastes, attention has again been directed to reducing the volumes which must be handled; Kushner[7] has shown that counter-current, or series, rinsing at low rates of flow are more efficient than parallel rinsing at much higher flow rates; he points out that degree of contamination in a final rinse tank can be readily calculated, and experimentally verified, from the equation:

$$C_n = R^n C_o$$

where C_n is the concentration of a particular constituent, as cyanide, in the final rinse tank, n is the number of rinse stations, C_o is the concentration of that constituent in the operating bath, and R—the rinse criterion—is the ratio of the dragout per plating rack to rinse water rate (in terms of gallons per rack).

This equation has been proved valid when racks are plated at regular intervals, when the rinse tank contents are completely mixed, and when the concentrations of plating solution constituents, ie, the results of dragout, in the rinse tanks are low with respect to the plating bath concentrations. All of these conditions are readily met with presently available automatic plating conveyors, barrel or rack.

RECOVERY BY EVAPORATION

It is the purpose of this paper to show how careful attention to rinsing procedures, coupled with relatively inexpensive purification and evaporation equipment, can eliminate out-of-pocket expenses for rinse wastes destruction equipment and operating costs; these new approaches have been applied to the chemically troublesome chromic acid and cyanide rinses, both being toxic and valuable.

Zinc Cyanide Plating Solution Recovery

Probably the first practical application of counter-current rinsing coupled with evaporative recovery was described by Keller and Associates[8]; recovery of chromic acid and elimination of chrome destruction equipment were the goals of this attempt. Weisberg and Quinlan[9] reported what was probably the first recovery procedure for zinc cyanide plating solutions in a closed system. They were able to show that efficient rinsing was assured by suitable series rinse operations at a total rinse rate of 1.0 gpm on an automatic barrel plater, and that a maximum of about 0.5 gpm was completely adequate for an automatic rack machine. The discharges from these two machines was concentrated in multiple effect evaporators at a reported cost of $0.15–$0.20/lb of sodium cyanide, thereby eliminating the necessity of spending $0.70 on chlorine and alkali for sodium cyanide destruction. A "bonus" of recovered plating solution, together with return of the rinse water (condensate) also resulted.

Since this first installation, others have been installed, or are being installed, on zinc, cadmium and copper cyanide solutions, the latter two being much more valuable metals than zinc. A study of a particular application will be of interest:

A manufacturer about to purchase an automatic zinc barrel machine was faced with the problem of limited space for the rinse water destruction plant; preliminary studies indicated the machine would discharge a minimum of 8–10 gal/min from each of two rinse stations. Total cyanide bearing rinses would thus be 16–20 gal/min. Since the state authorities having jurisdiction would not permit continuous cyanide destruction, but insisted upon batch treatment, the minimum sized destruction vessels required would be 5,000 gallons capacity with four hour fill periods, and alternate use of two basins, 11 feet in diameter by 8 feet deep each. The floor space required for this system was not available.

Cooperative research on the part of the plating equipment manufacturer and the waste treatment engineers established that the work to be handled caused a drag-out of 0.07 gallons of plating solution per barrel, or 4.2 gal/hr at the normal plating rate of 60 barrels per hour. Application of Kushner's equation, supplemented by field tests, established that four counter-current rinses operating at a total flow of 1.05 to 1.10 gal/min would effectively rinse the work. Total rinse water demand, including a small safety factor was therefore determined to be 1.25 gal/min for the machine, a total of 75 gal/hr.

While destruction of the cyanide waste in this reduced

volume was considered, the possibility of evaporation to recover the waste in a usable form was investigated. The closed circuit evaporation system finally selected is shown on Figure 1.

The plating machine originally considered was to be equipped with one reclaim and two rinse stations; conversion of the reclaim to a rinse station and addition of a second rinse station added approximately $3,000.00 to the cost of the machine, a relatively small increase in comparison with the total plater cost.

Comparisons of destruction and recovery of zinc cyanide waste in this installation are shown in Table I; recovery costs are less than the dollar value of the recovered plating bath constituents, making the system economically attractive for this reason. But, when compared with the costs of the destruction and replacement method, where there is only "out-of-pocket" expense, the recovery procedure is proved to be the only sound answer.

As a result of these studies, the necessary modifications to the plater have been made, and the evaporation equipment is about to go into service. Data covering initial operations will be available within a year, and are expected to confirm the suitability of the system selected.

It is at once apparent that other cyanide solutions, namely cadmium and copper, possibly silver, will show even more favorable results because of the higher costs of these metals over zinc, and units operating on these solutions are in the planning stage. Obviously, mixtures of metallic cyanides cannot be handled together, as a mixed plating solution would result, but the recovery made possible by evaporation permits separate units where more than one kind of cyanide plating is regularly done. In Table I, the hourly cost of recovering 4.2 gallons of zinc plating solution worth $1.10 is shown to be about $0.85; if applied to conventional cadmium cyanide baths, with cadmium costing $1.70/lb, the plating solution recovered hourly would be worth about $1.75 with a recovery cost of $0.85. These figures do not consider the added costs of the alternative destruction system.

Chromic Acid Plating Solution Recovery

Chromic acid may be recovered from dilute rinse waters as readily as cyanide solutions, and at somewhat lower costs; nickel solutions have also been recovered in this fashion.[2] In the past, however, chromic acid rinse rates have been high, resulting in dilute solutions which must be treated by a chromic acid demineralizer to "concentrate" the chromium before it can be economically further concentrated to plating bath strength in an evaporator.[2]

In an existing decorative chrome plating installation, a study was made to reduce rinse rates in order to permit direct evaporation of water without preliminary cation-anion exchange treatment; the plant had been operating with two reclaim or still rinses and two flowing rinses.

Every second day the first reclaim tank was discharged, the contents of the second transferred to it and then refilled with fresh water. Difficulties in plating were encountered with this procedure due to the return of metallic impurities with the chrome solution, and primarily because only a small portion of the reclaim could be returned, from volume considerations, the bulk being diverted to other uses, make-up, etc., in the plant.

Consideration was therefore being given to a demineralization system with evaporator, not only to recover the considerable amounts of chrome being lost in the running rinses, but also to purify and concentrate the still rinses to remove metallic contaminants.

Since the weakest link in the chrome deionizing system is the anion exchange resin through which caustic is recycled to build-up chromate concentration, prior to the vacuum evaporation step, the reduced rates of countercurrent rinsing were doubly attractive; it was believed that concentrations of chromic acid high enough to permit direct evaporation—after cation exchange only to remove metal contaminants—would thereby be achieved.

The two reclaim and two flowing rinses were converted to series rinse stations for field study; these tests established that at a rinse rate of 0.8–0.9 gpm complete and efficient removal of plating solution occurred, with a residual chromic acid concentration in the fourth tank of less than 4 ppm.

Because an atmospheric evaporator operates without cooling water, and water was at a premium in the plant, this type was selected; Figure II illustrates the final installation. A very small demineralizer supplies rinse water to the line—to avoid introduction of water borne solids to the plating tank with the recovered chrome—the rinse overflow is collected in a receiver at a maximum rate of 1.25 gal/min, passed through a cation exchanger for purification, and concentrated to the bath strength of 53 oz CrO_3/gal.

Table II tabulates the results being obtained with the newly installed systems, and contrasts these results with the destruction system previously used. The system recovers all of the chromic acid dragged from the bath and returns it in a purified, concentrated form.

The value of the reclaim rinse solution in excess of that capable of being accepted by the bath—in the case of the procedure formerly used—cannot be classified as "cost" in that it is not actually lost, but diverted to other plant make-up uses. However, its removal from the bath must be compensated by additional chemical make-up at the cost shown on the table.

SUMMARY

In conclusion, it has been pointed out that careful attention to rinsing, with the intent of accomplishing the desired result with the minimum amount of water, minimizes waste treatment costs, and often permits the inclusion of otherwise unfeasible concentration equipment capable of converting out-of-pocket expense to profitable recovery.

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[2]Hesler, J. C., Plating, **42,** 1019, (1955).

[3]Costa, R. L., Ind. Eng. Chem., **42,** 308 (1950).

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TABLE I COST COMPARISON, RECOVERY VERSUS DESTRUCTION, ZINC CYANIDE RINSE WATER TREATMENT

Conditions: One Barrel machine, 60 barrels per hour, dragout 4.2 gal/hr, rinse rate 75 gal/hr total with 4–300 gallon rinse stations.
Plating Bath Composition: 5 ounces zinc, 14.2 ounce sodium cyanide, 12 oz caustic soda/gal

Recovery System (Based on 24 hr operation)	
Cost of Operation	
Steam: 8300 lbs @ $0.75/thousand	$ 6.33
Cooling Water: 43,000 gal @ $0.04/thousand	1.72
Labor for Maintenance, checking: 2 hrs @ 2.00	4.00
Power: 15 KWH @ $0.015/KWH	.23
Equipment Amortization: 10 year life	8.00
Operating Cost:	20.28
Chemicals Recovered	
Zinc: 31.6 lb @ 8.20	$ 6.32
Sodium cyanide: 89.9 lb @ $0.18	16.18
Sodium hydroxide: 75.6 lb @ $0.05	3.78
Condensate: 1800 gal @ $0.04/thousand	0.07
Value of Recovered Chemicals:	$26.35
Less Operating Cost:	20.28
Net Daily Gain:	$ 6.07

Destruction System (Based on 24 hr operation)	
Cost of Operation	
Chlorine: 325 lbs @ $0.10	$32.50
Sodium hydroxide: 247 lbs @ $0.04	9.88
Labor for operation: 2 hrs @ $2.00	4.00
Power: 8 KWH @ $0.015/KWH	.12
Equipment Amortization: 10 year life	1.50
Cost of Chemical Replacement to Bath	
Zinc: 31.6 lb @ $0.20	$ 6.32
Sodium cyanide: 89.9 lb @ $0.18	16.18
Sodium hydroxide: 75.6 lb @ $0.05	3.78
Rinse Water	
1800 gallons @ $0.04/thousand	0.07
Expense per Day:	$74.35
Chemicals Recovered:	none
Net Daily Cost:	$74.35

TABLE II COST COMPARISON, RECOVERY VERSUS DESTRUCTION, CHROMIC ACID RINSE WATER TREATMENT

Conditions: Automatic chrome rack plater, dragout 2.6 gal/hr, rinse rate 75 gal/hr total with four rinsing stations.
Plating Bath Composition: 53 oz CrO_3/gal

Recovery System (Based on 20 hour operation)	
Cost of Operation	
Rinse Water: 1800 gallons @ $0.06/thousand	$ 0.11
Sulfuric Acid: 7.0 lb @ $0.02	0.14
Caustic Soda: 2.5 lb @ $0.04	0.10
Sulfuric acid regenerant for cation exchanger in metallic contaminant removal: 20.0 lb @ $0.02	0.40
Steam: 17,500 lb, 50 psig, @ $0.80/thousand	14.00
Power: 25 KWH @ $0.02/KWH	0.50
Labor: 2 hrs @ $2.00	4.00
Equipment Amortization: 10 year life	5.70
Operating Cost:	$24.95
Chemicals Recovered	
CrO_3: 172 lb @ $0.30	$51.60
Less operating cost:	24.95
Net Daily Gain	$26.65

Destruction System (Based on 20 hour operation and rinsing system previously used)	
Cost of Operation	
Sulfur dioxide: 24.5 lb @ $0.10	$ 2.45
Lime: 31 lb @ $0.0125	.38
Power: 4 KWH @ $0.02	.08
Labor: 2 hr @ $2.00	4.00
Amortization: 10 year life	2.00
Cost of Chemical Replacement to Bath from Running Rinses	
CrO_3: 24.5 lb @ $0.30	7.35
Value of Reclaim Rinse in Excess of that Returned to Plating Bath and Diverted to Other Uses:	
CrO_3: 126 lb @ 8.30	37.80
Net Daily Cost:	$54.06

K. Odland completed his studies in chemistry and mathematics on a BS level at the University of Bergen, Bergen, Norway, in 1950. From 1950 to 1951, he taught these subjects at a senior high school in Bergen.

He has been engaged in water and waste treatment engineering in this country since 1951 and at present is a project engineer in the Water and Waste Division of Industrial Filter and Pump Mfg. Co., Chicago, Ill.

J. C. Hesler received his BS degree in chemistry from the University of Chicago in 1937, and a MS in organic chemistry in 1938.

He has been engaged in water and waste treatment work since 1938, and at the present time is manager of the water and waste treatment division of Industrial Filter & Pump Manufacturing Company, Chicago, Illinois, directing its program of research in plating wastes and related problems.

The final article of "Procedures for Analyzing Metal-Finishing Wastes" by Dr. E. J. Serfass and Dr. R. F. Muraca follows. This is the last of a series which has been carried in PLATING magazine for more than two years. No better use of editorial space could possibly have been made. This series was one of the products of the Ohio River Valley Water Sanitation Commission. ORSANCO is one of the outstandingly successful undertakings of its kind in the United States. Its whole story is well worth the telling. William J. Neill, who was President of the AES during ORSANCO's inception, has been kind enough to furnish PLATING the ensuing brief sketch.

The Editor

THE OHIO RIVER VALLEY WATER SANITATION COMMISSION

(Its background and its connection with the analysis of Plating Room Wastes.)

On June 30, 1948, the Governors of the states of Illinois, Indiana, New York, Ohio, Pennsylvania, Virginia and West Virginia met in Cincinnati and signed a solemn compact, pledging their states to the greatest stream pollution program ever undertaken in the nation so that as of that date a problem which had caused increasing concern and great discussion since as far back as 1908 was at last going to be attacked in an intelligent and energetic manner.

On July 1, 1948, at a meeting in Cincinnati the Commission was officially formed with three representatives from each of the signatory states as members with Hudson Biery as Chairman and Edward J. Cleary as Executive Director and Chief Engineer. The first year of operation was necessarily taken up with organization and planning and the first annual report published in June, 1949 indicates to what extent the problem had been analyzed and a program planned.

In June of 1949 at the invitation of the Commission a group of leaders engaged in the metal finishing industry met in Cincinnati to form what was to be known as the Metal Finishing Action Committee, the first of several Committees to be formed to study the problems peculiar to their particular industries.

The American Electroplaters' Society was represented at the first meeting by Dr. Fred Gurnham and Webb Knight. At the next meeting in October of that year William Neill, then President of the AES, became the liaison member of the Society and the Committee and has continued in that capacity since. Other members of the Society who have served on the Committee since its organization are Walter Pinner, Harold Farber and William Toller.

By January 1950 the Committee, after much discussion, realized that probably their most important function was to acquaint the industry with the problems involved and attempt a program of education which it was hoped would tend to reduce the volume of pollution attributed to the metal finishing industry.

It was felt that the compilation of certain helpful information which was more or less common knowledge but which had never before been condensed in one volume would be very advantageous for this purpose, and so the first of several volumes produced by this Committee was printed. The title was "Plating Room Controls for Pollution Abatement," and soon became known as the "Good Housekeeping" manual and was distributed through the industry with favorable comment.

Other publications dealing with flow rates, measurement of flow and methods of planning of sewage systems were also published. Another manual dealing with an evaluation of the various processes for the treatment of plating wastes also received excellent reception. It was early realized that there was no general standardization of methods of analysis for the various materials constituting plating wastes. Therefore, in September 1951 a sub-committee was formed with William Neill as Chairman, to produce a manual on standard methods of analysis for these materials in the presence of the interfering ions present in these effluents.

The results of Project 2 of the AES which had been conducted at Lehigh University under Dr. Earl Serfass was heavily relied on as a back log of very valuable information for the start of this new manual. With the cooperation of the AES and $5000.00 from the Commission a new project was activated at Lehigh. Dr. Serfass again directed and Dr. Ralph Muraca assisted, to find the answers still lacking at the completion of Project 2 and whip them into form for publication.

The overall direction of this program resulted in over four thousand pieces of correspondence being written with eight industrial firms and over fifty individual members contributing untold hours of testing and evaluation before the methods were finally ready for publication. The result of this effort was then published under the title of "Standard Methods of Analysis for Plating Room Wastes" by the Ohio River Valley Water Sanitation Commission. This material has also been published in a number of single articles in PLATING and has had wide and favorable reception.

The Metal Finishing Committee has one project still in the preparation stage which will attempt to determine the toxicity of not only the materials used in plating but also many more which can be classified as industrial wastes. The determination of whether a material is dangerous or not is one of the most important questions in the field of water pollution control. This could very well be the most valuable work of all.

The cooperation between the American Electroplaters' Society and the Ohio River Valley Water Sanitation Commission has been a wonderful example of what technical societies, industry and the regulatory agencies can accomplish when they work together.

ANALYTICAL DETERMINATION OF TRACE CONSTITUENTS IN METAL FINISHING EFFLUENTS

XVI. The Colorimetric Determination of Total and Free Cyanides

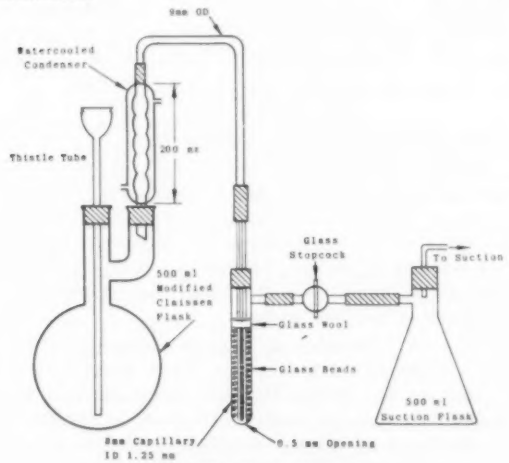
By E. J. SERFASS* and R. F. MURACA†

THE FOLLOWING PAPER, THE FINAL ONE OF A SERIES, IS A RESULT OF THE WORK SPONSORED AT LEHIGH UNIVERSITY BY THE AES AND THE OHIO RIVER VALLEY WATER SANITATION COMMISSION. WHILE THE ORIGINAL PROCEDURE WAS WORKED OUT UNDER AES SPONSORSHIP, THE MODIFICATION WAS DEVELOPED UNDER ORSANCO SPONSORSHIP, THE COMMISSION HAVING PLACED THE PROJECT AT LEHIGH SO AS TO BE ABLE TO UTILIZE THE BACKGROUND DEVELOPED BY AES PROJECT NO. 2. IT SHOULD BE NOTED THAT THE METHODS DESCRIBED IN THIS SERIES WERE TESTED, MODIFIED IF NECESSARY, AND RETESTED BY AT LEAST SIX AND SOMETIMES AS MANY AS TWELVE INDUSTRIAL LABORATORIES. AS A RESULT OF THIS, THE APPROVED FORM, AS PUBLISHED HERE, WAS DEVELOPED.

ABSTRACT

A colorimetric procedure for the determination of the total cyanide content of effluents in the concentration range of 0.2 to 50 ppm is presented. The method was found to yield satisfactory results under a wide range of conditions and sample concentrations. The procedure was developed, tested and studied under conditions involving the simultaneous presence of 24 common metallic impurities with concentrations 1000 times as great as that of the cyanide.

The method makes use of a distillation procedure for concentrating and removing the cyanide from either simple cyanides or complex cyanides by refluxing the sample with dilute sulfuric acid and cuprous chloride. The liberated HCN is collected in caustic and converted into cyanogen chloride by chloramine-T. The cyanogen chloride is allowed to react with pyridine in the presence of 1-phenyl-3-methyl-5-pyrazolone resulting in a deep blue color, the intensity of which is proportional to the cyanide concentration.



Cyanide Distillation Apparatus

THE DETERMINATION OF TOTAL CYANIDES IN EFFLUENTS

The classical method for the determination of free cyanide, such as sodium cyanide or other cyanides which are easily dissociated into CN^-, (Liebig's modified method[1]) is widely used when relatively large quantities of cyanide are present. This method is not easily applicable to the analysis of cyanides in effluents for only small quantities are present in a properly treated effluent.

In order to extend the sensitivity of methods for the analysis of cyanides into the microquantity region, colorimetric procedures are generally employed. One of the first of these methods was due to Waller[2] and was based on the formation of an ephemeral coloration with sodium picrate in alkaline cyanide solutions. A method that was proposed by Viehoever and Johns[3] utilized the formation of prussian blue. Another version of this procedure has recently been proposed by Gettler and Goldbaum[4] and was modified by Hubach[5] for use in determining cyanides in wines. Hubach's modification is based on the use of cuprous chlorides as a catalyst for the decomposition of complex cyanides into HCN. A method involving the oxidation of ocresolphthalin by cyanide in the presence of a copper catalyst was proposed by Nicholson.[6]

In the procedure proposed by Aldrige[7] for the determination of small amounts of cyanide, an orange color is developed from pyridine-hydrochloride with the cyanogen halide that is formed by the treatment of cyanide (or thiocyanate) with an N-halosulfonamide. Epstein[8] modified this procedure by forming glutaconic aldehyde from the reaction of cyanogen halide with pyridine and subsequently producing a blue pyrazolone dye by condensing the aldehyde with 1-phenyl-3-methyl-5-pyrazolone.

All simple cyanides and complex cyanides can be decomposed into HCN by treatment with dilute acid. With

* Head of Chemistry Dept., Lehigh University, Bethlehem, Pa.
† Group Leader, Analytical Chem. Dept., Jet Propulsion Lab., California Institute of Technology, Pasadena, Calif.

more concentrated acid, ammonia, carbon monoxide, and formaldehyde are also formed. Some complex cyanides, especially ferrocyanides, ferricyanides, and cobalticyanides are only slowly decomposed by boiling with dilute acid. It was shown by Hubach[5] that the addition of cuprous chloride to a dilute solution of sulfuric acid catalyzes the decomposition of ferrocyanides. During the investigation of this procedure, no difficulty was encountered in decomposing complex cyanides, in fact, Bassett and Corbet[9] showed that the decomposition of cobalticyanides by boiling, dilute sulfuric acid was stoichiometrically complete, although slow.

The distillation of HCN from both simple and complex cyanides by means of boiling, dilute sulfuric acid affords both a concentration and an isolation of the total cyanide content. A joint effort of the research committees of AES Research Projects Nos. 2 and 10[10] had already shown that the distillation of HCN was suitable for analyzing plating solutions.

DESCRIPTION OF THE METHOD

A sample of the effluent is introduced into the distilling flask (Figure 1) by means of the funnel tube. A slow stream of air is allowed to bubble into the sample by the gentle application of suction to the safety trap, the stream of air is controlled so as to prevent the loss of the liquid in the absorption trap. Then, the contents of the distilling flask are heated to cause a slow refluxing. At this point dilute sulfuric acid is added in small increments via the funnel tube. This is followed by the addition of cuprous chloride. The refluxing, together with the slow passage of air is continued for at least 2 hours. It has been found that this amount of time is necessary for the complete removal of the cyanide from the sample. The stream of air serves to flush out the HCN vapors as they are formed and to carry them into the absorption medium. Refluxing is necessary to prevent a concentration of the acid in the distilling flask. The absorption trap contains a solution of sodium hydroxide in which HCN is very soluble through a reaction yielding sodium cyanide.

The sodium hydroxide-sodium cyanide solution in the absorption train is then neutralized to about *p*H 9 to remove excess base and diluted to a fixed volume. Aliquot portions of this solution are then treated with Chloramine-T to form cyanogen chloride. The cyanogen chloride is then allowed to react with pyridine to form glutaconic aldehyde which in turn is treated with 1-phenyl-3-methyl-5-pyrazolone to form a blue dye. The chemistry of the reactions leading to the color formation are described by Epstein,[8] *q.v.* It was found that the color formation could take place only in the presence of bis(1-phenyl-3-methyl-5-pyrazolone) and that the color intensity was linearly related to the concentration of cyanide in the range 0.2 to 1.2 micrograms of CN^-.

The presence of large amounts of thiocyanate in the sample will cause a small error owing to the volatility of thiocyanic acid. The thiocyanic acid reacts like cyanide in that it will be converted to cyanogen chloride which, in turn, will form the identical blue dye with the pyridine-pyrazolone reagent.

Many workers have experienced difficulty in using the cuprous chloride distillation because of the presence of large quantities of cupric chloride in the cuprous salt. When cupric chloride is present, a loss of cyanide will result:

$$2\ Cu^{+2} + 2\ OH^- + 7\ CN^- \rightarrow 2\ Cu(CN)_3^{-2} + CNO^- + H_2O$$

Since the absence of cupric chloride can not be absolutely assured, it is necessary to standardize the analytical procedure by using known amounts of cyanide and obtaining a calibration curve. Differences between the amounts introduced and the amounts recovered may be attributed largely to the presence of cupric chloride. A large number of investigators have erroneously attributed these differences to incomplete decomposition of the complex cyanides.

At first sight, it would seem that procedures using $MgCL_2$[10] yield better results than procedures using Cu_2Cl_2. When pure solutions of cyanide are used, distillation with $MgCl_2$ release HCN more rapidly for the complex cuprocyanides formed with Cu_2Cl_2 release HCN slowly when boiled with acid. However, metal finishing wastes usually contain complex cyanides which release HCN slowly, and so little advantage is to be gained by the use of $MgCl_2$. Furthermore, there is always the possibility that an alkaline sample of metal finishing waste contains substances which can oxidize cyanide, especially in acid solutions. When such oxidants are present, the use of cuprous chloride presents interference to a certain extent, for the initial addition of cuprous chloride to the alkaline cyanide solution binds cyanide as a complex cuprocyanide. On acidification, the oxidizing substances which escaped reduction in alkaline solution are destroyed and the cuprocyanide ions remain virtually untouched.

Sensitivity of the Method:

The sensitivity of the method defined as the number of micrograms of cyanide which must be present in 1 ml of the 100 ml-sample of effluent taken for analysis in order that this quantity can be determined with a relative error of ± 50 per cent. This corresponds to a cyanide concentration of 0.1 ppm or 10 micrograms of CN^- in the distilling flask. With suitable modification, involving sample size and other dilutions, the sensitivity can be greatly increased. The sensitivity of the method is not governed by the amount of impurities present in the sample.

Limit of Detection of the Method:

The limit of detection of the method is defined as the number of micrograms of cyanide which must be present in 1 ml of the 100-ml sample of effluent taken for analysis so that an extinction of 0.005 for a 1-cm cell thickness at 620 millimicrons will be obtained in step 15. This corresponds to 0.02 ppm or a concentration of 0.2 microgram of cyanide in the distilling flask.

The limit of detection can be greatly increased by suitable modifications of the method. There seems to be no impediment to lowering the limit of detection to any desired value save the limitations imposed by the size of the distillation equipment. The limit of detection is independent of the quantities of the impurities present.

Discussion of the Blanks:

The presence of colored substances in the sample will not interfere for the cyanide is removed by distillation. The color of the blank is governed wholly by the Chloramine-T and the pyridine-pyrazolone reagents. It has been found that when freshly prepared reagents are used, the blank has an extinction essentially equal to that of distilled water, but a slight extinction may occur because of refractive index differences and the inevitable colorations which are associated with organic reagents.

Recommended Procedure:

This procedure is designed to be used for the accurate determination of total (free and complex) cyanide in effluents in the range of 0.2 microgram to 1.2 micrograms/ml in a 100-ml sample of effluent. If analyses are to be made on effluents containing more than 1 ppm but less than 5 ppm, of cyanide, use 25-ml samples. For concentrations in the range of 5 to 50 ppm use 2-ml samples.

Reagents Required:

(1) **Sodium Hydroxide:** 4 per cent (w/v). Dissolve 40 gm of sodium hydroxide pellets and make up to 1 liter.

(2) **Sulfuric Acid:** 1:1. Pour 500 ml of concentrated sulfuric acid into 500 ml of water. Cool before using.

(3) **Cuprous Chloride:** Use finely powdered reagent grade material.

(4) **Hydrochloric Acid:** (N). Dilute 83.5 ml of concentrated acid to 1 liter.

(5) **Chloramine-T:** (1 per cent) Dissolve 1.0 gm of the powder in 100 ml of water.

(6) (**1-Phenyl-3-methyl-5-pyrazolone**): A satisfactory product can be obtained from Eastman Kodak Company (No. 1397).

(7) **Pyridine:** Use only reagent quality material.

(8) **Bis(1-phenyl-3-methyl-5-pyrazolone):** This dimer must be prepared as follows: Dissolve 17.4 gm of the pure 1-phenyl-3-methyl-5-pyrazolone in 100 ml of 95 per cent ethanol. Twenty-five grams of freshly distilled phenyl-hydrazine are added and the mixture refluxed for at least 4 hours. The insoluble portion which is filtered off and washed with hot alcohol is bis-(1-phenyl-3-methyl-5-pyrazolone.)

(9) **Pyridine-Pyrazolone reagent:** Note: Prepare as needed a few minutes before each analysis. Solution A: Add 0.25 gm of 1-phenyl-3-methyl-5-pyrazolone to 50 ml of distilled water. Heat the solution to about 60° C with stirring. Replace the water lost by evaporation if necessary. Cool to room temperature. Solution B: Dissolve 0.01 gm of the bis-pyrazolone in 10 ml of pyridine.

Immediately before use, pour solution A into filter and catch the filtrate. Then pour solution B through the same filter and catch the filtrate in the same container with solution A. Stir well and immediately pipette the solution into the 10 ml volumetric flask containing the cyanide-chloroamine-T mixture. (See step 14.)

(10) **Sodium Cyanide Solution:** Stock solution, 1 gm of CN^- per liter as sodium cyanide: Weigh 1.884 gm of pure sodium cyanide and dilute to 1 liter.

Take 10 ml of the stock solution and dilute to 1 liter. This is equivalent to 10 micrograms of cyanide per ml. Make up this solution fresh as needed. For purposes of establishing a calibration curve, take 2, 4, 6, 8, 10, and 12 ml samples of this solution and dilute to 100 ml in each case. These solutions, containing 0.2, 0.4, 0.6, 0.8, 1.0, and 1.2 micrograms/ml, are used as samples in step 12.

Procedure:

(1) Set up the equipment shown in Figure 1, adhering to dimensions as much as possible.

(2) Introduce 100 ml of the alkaline effluent into the distilling flask by means of the funnel tube.

(3) Fill the absorption trap a little over half full with 3 mm glass beads and arrange a wad of glass wool over them to aid in holding them down as well as preventing spray carry-over. Then add enough 4 per cent NaOH solution so that a gentle stream of air bubbling through the trap will not cause a loss of the absorption medium by overflow.

(4) Start a gentle stream of air bubbling into the sample solution by gently applying suction to the system and using the stopcock or clamp to control the flow of air so that no carry-over of the absorption medium in the trap will occur.

(5) Gently heat the contents of the distilling flask, gradually boiling it at such a rate that a slow refluxing action occurs.

(6) Now add 50 ml of 1:1 H_2SO_4 in small increments via the funnel tube.

(7) Pour 0.5 gm of finely powdered cuprous chloride into the funnel tube and wash into the distilling glass by means of a stream of water from a wash bottle.

(8) Continue the refluxing and the passage of air for 2½ hours.

(9) Disconnect the delivery tube leading into the absorption trap and wash the solution in the absorption trap into a 150-ml beaker. In washing the absorption trap, take care that no beads fall into the beaker. The beads in the trap must be washed well.

(10) Neutralize the solution in the beaker with 1 *N* HCl to a *p*H of about 7.5, at no time having an excess of acid present (avoiding loss of cyanide by evolution of HCN.)

(11) Quantitatively transfer the contents of the beaker to a 100-ml volumetric flask and bring to the mark with water.

(12) Transfer 1 ml of this solution to a 10-ml volumetric flask by means of a pipette.

(13) Add 0.2 ml of 1 per cent Chloramine-T solution, stopper and shake well. Let the solution stand at least 1 minute in a cool place.

(14) Add 8 ml of the freshly prepared pyridine-pyrazolone reagent and bring the volumetric flask to the mark with water. Stopper and shake well.

(15) Wait at least 8 minutes and then read the extinction of the solution in a photometer at 620 millimicrons. If the pyridine-pyrazolone reagent is made fresh, sufficient accuracy will be had by using distilled water as a reference liquid. If desired, the reference liquid may be made by mixing 1 ml of water, 0.2 ml of Chloramine-T, 8 ml of pyridine-pyrazolone reagent and diluting up to 10 ml in a volumetric flask.

(16) If necessary, convert the scale readings of the photometer to extinction. Subtract the blank reading from the sample reading. If a calibration curve is being established, plot these corrected readings versus micrograms of cyanide added. If a sample is being run, read the amount of cyanide present from the calibration curve. Recall that the calibration curve is established on a basis of a 100 ml sample of effluent. If a 25 ml sample is taken for analysis, multiply the micrograms of cyanide read from the calibration curve by 4. For a 2 ml sample, multiply by 50.

(17) A colorimeter employing a Klett-Summerson No. 66 red filter or an Evelyn No. 580 filter may be used in place of a spectrophotometer with no significant loss in sensitivity.

Recommended Procedure for Free Cyanide:

This procedure is to be used for the determination of "free" cyanide in effluents in the range of 0.2 micrograms to 1.2 micrograms of cyanide per ml in an original sample effluent of 100 ml. For cyanide contents greater than 1 ppm but less than 5 ppm, use 25-ml samples, and for contents of 5 to 50 ppm, use 2-ml samples.

The "free" cyanide content of the sample as determined by this procedure represents the HCN which can be liberated from the sample by boiling with dilute acetic acid. The alkali metal and alkaline earth cyanides as well as the simple complex cyanides such as those of zinc and cadmium liberate HCN upon treatment with acetic acid. Since these cyanides, if present in an effluent, would liberate HCN upon dilution, the importance of determining their presence is obvious.

Reagents Required:

Same as for the procedure for Total Cyanide, also: **Glacial Acetic Acid:** reagent Grade.

Special Equipment:

Same as for the procedure for Total Cyanide.

Procedure:

Omit steps 3 to 7 of the Procedure for Total Cyanide. In place of these steps, substitute the following: Add 50 ml of Glacial Acetic Acid in small increments via the funnel tube.

Variations of the Recommended Procedures:

When the composition of the effluent is known, the recommended procedures can be shortened.

The following table summarizes the changes that can be made in the procedures when the composition of the effluent is known. Unless otherwise stated, the concentration of each of the other elements in the total sample taken for analysis must not exceed 20,000 micrograms.

Composition of the Effluent	Changes in the Recommended Procedure
No complex cyanides (iron, cobalt, etc. absent).	Use the procedure for free cyanide.
All metals below 5 ppm Thiocyanate absent.	To a 10 ml sample in a test tube, add 2 ml of Chloramine-T solution. Immediately stopper and shake. After one minute, add 3 ml of the pyridine pyrazolone reagent, stopper and shake. After 20 minutes, measure the per cent T using a red filter. Use calibration curves.

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Dr. Earl J. Serfass, a recognized authority in the fields of chemistry, electrochemistry and metallurgy, served two consecutive terms as chairman of the important AES Research Committee. He is presently compiling for the AES a "Process Control Handbook." Recently he worked in cooperation with the Ohio River Valley Sanitation Commission which has just released a book on "Procedures for Analyzing Metal-Finishing Wastes," incorporating the results of AES project 2 at Lehigh University.

Dr. Ralph F. Muraca has been a regular contributor to Plating. He was an assistant professor in the department of chemistry at Lehigh University until August 1, 1955 and was more recently associated with an AES committee which studied the style and format of Plating. Dr. Muraca worked in cooperation with the ORSANCO committee on metal finishing wastes which recently published the book on "Procedures for Analyzing Metal-Finishing Wastes." This report incorporates results of AES Project 2 at Lehigh University with which he was also associated. Dr. Muraca is presently group leader, Analytical Chemistry Department, Jet Propulsion Labs at California Institute of Technology (Div. of Cal. Tech.).

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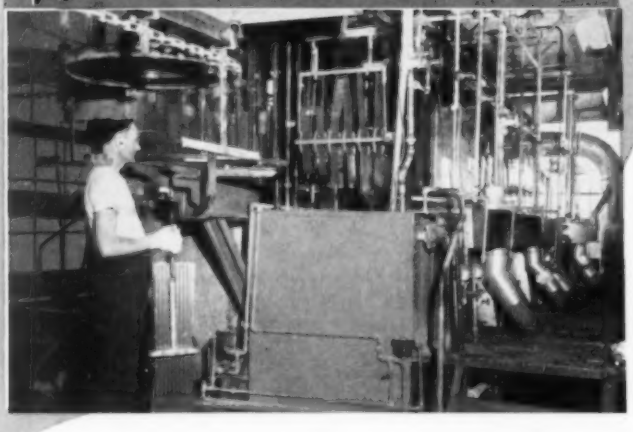

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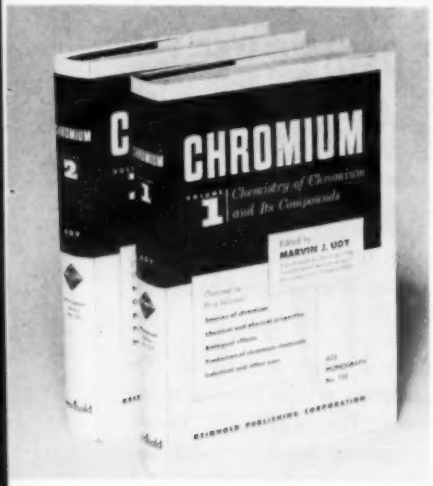

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MARVIN J. UDY is widely known for his process development work in chemical and metallurgical fields. His process for cadmium plating formed the basis of the Udylite Process Co. of Detroit. For several years he investigated and commercialized a process for the electrodeposition of chromium and chromium plating. He has also developed a process for treating low-grade chrome ores which has resulted in a complete line of exothermic ferroalloys and metals. These and many other chemical and technological achievements eminently qualify Udy to supervise the preparation of this exhaustive reference work.

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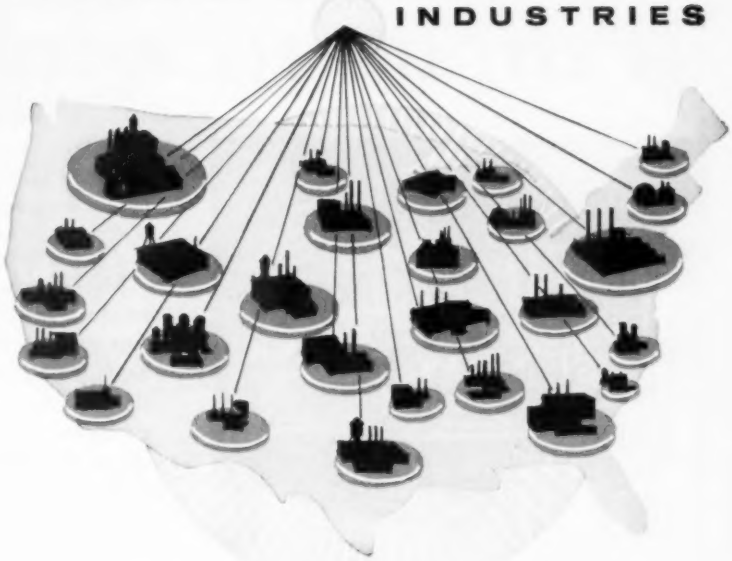

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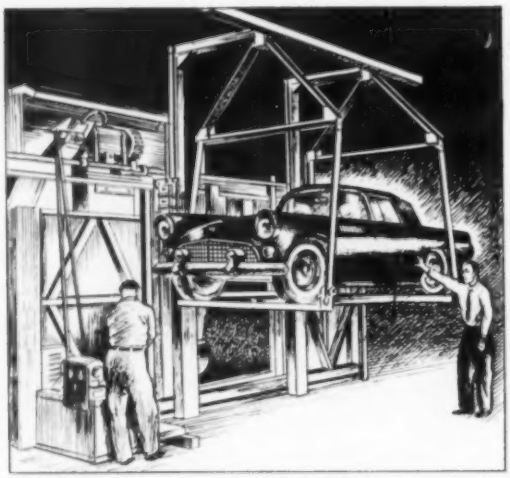


Wagner Elevator Mechanism Setup to Demonstrate Lift Capacity. All parts are standardized, pre-assembled, fully interchangeable.

Of course, Wagner Brothers, Inc. does not recommend using their improved automatic plating machine as a car hoist. But this demonstration proves quite dramatically its ability to handle dynamic loads of over 3200 lbs.

Fred Wagner, V. P. and Sales Manager, points out that this load capacity, being far more than normally required, reduces deflection throughout the lifting mechanism, eliminating excessive strain on all members, thus reducing wear, maintenance and downtime. He also states that precise adjustments of critical transfer members can be made by untrained personnel armed with nothing but a set screw or end wrench; hardened rollers guiding the vertical lift work on a rocker arm principle so that adjustments may be made in any direction, including the main lift boom, carrier lift angle assemblies and carrier rail supports.

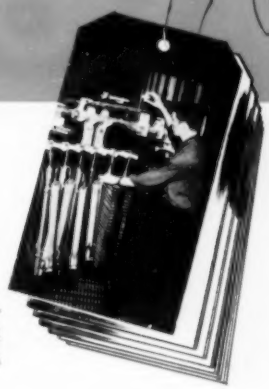
Standard gear racks and pinions are used throughout the entire elevator mechanism, so that maintenance and possible replacement is simplified. Easy access to rollers makes direct lubrication feasible or a central lubrication system may be incorporated. While standard capacity is 1000# per lift, substitution of a heavy duty rack increases efficient load capacity 50%.

Mr. Wagner explained some details of the production tooling program which has been inaugurated to turn out this improved, much heavier but precision plating machine. All details are interchangeable, precision drilled and machined and pre-assembled; no drilling is done on final assembly in the customer's plant, (except in some instances where a drill jig is used.) Every part is drilled, reamed, tapped and milled in special coordinated fixtures; sections are assembled in giant jigs and are designed for foolproof self-alignment. Machines may be lengthened or shortened to suit long term production changes, as tanks and lift mechanism may be shifted without difficulty; parts and entire sections may be replaced. A single hydraulic power unit is interconnected to two hydromotors, the source of power for all lift and transfer operations; micro adjustment of acceleration and deceleration permits work carriers to be lifted, transferred and deposited gently without vibration, jarring and loss of parts.

As proof of the simplicity of installation, Mr. Wagner stated that the first of the heavier, modular type automatics was installed as a preenameling system for a large stove manufacturer. Approximately 113′ in length, the machine was dry cycling four days after delivery, needing only routine adjustments. He also pointed out that altho the lift raised only 13′, an advantage in plants of normal ceiling, the machine is capable of handling 100 racks per hour, approximately 100 pounds per rack. The Wagner Brothers Dix Avenue Plant in Detroit is devoted exclusively to quantity production of automatic plating systems, tanks and germanium and selenium rectifiers. Full details on the automatic are contained in a technical bulletin, copies of which may be obtained by writing . . . Midland, Detroit 3.

From H-VW-M

10 important ways to keep metal finishing costs down



All the processes, supplies and equipment in H-VW-M's line have been designed for maximum efficiency and cost savings. But among this full line are a group of products and processes which – if they apply to your operations – can offer outstanding costs and labor saving advantages. Included in this group are high-efficiency electrical and processing equipment, unusual processes, and finishing supplies having unique advantages.

The scope of the exceptional H-VW-M products, described on the following pages, covers a wide range of plating and finishing operations of every type, and the likelihood is strong that several, or perhaps all, are applicable to your plating plant. By investigating all of them, you should strike just the process, equipment or supplies you need to effect very real economies in your operations.

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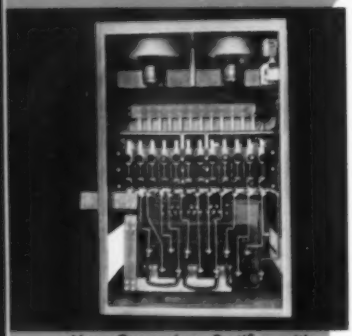

New Germanium Rectifier with panel removed to show simplified construction.

Manual Tap Switch Control

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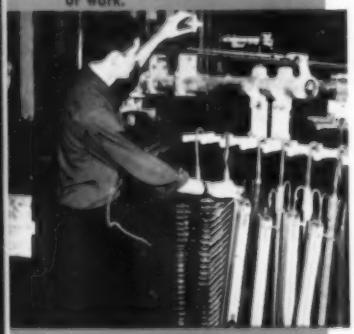
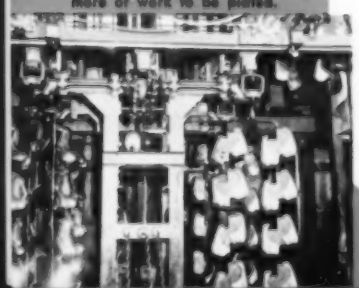
Saturable Core Reactor

Operator is shown adjusting the Dial-A-Cycle mechanism that will determine the cycle for this rack of work.



Automatic loader-unloader has just removed two racks of plated bumper guards and loaded two more of work to be plated.



GERMANIUM RECTIFIERS

Although only recently added to the H-VW-M family of electrical equipment, H-VW-M Germanium Rectifiers are already widely used in plating, anodizing and related processing, where they are known for their efficiency, economy of operation, compactness, and close voltage control. Available in 6 to 80 volt capacity models with current outputs of from 500 to 10,000 amperes (or, in combination, unlimited output), these dependable, easy-to-maintain rectifiers available in either self-contained or remote controlled models, are designed for 24-hour-a-day operation at full capacity.

At full load, with voltage outputs of 12 volts and above, H-VW-M Germanium Rectifiers have efficiencies in excess of 90%. At ¼ and ½ loads, efficiencies are exceptional. Voltage regulation of as low as 5% can be obtained from no load to full load at voltage ratings of 20 volts and above.

Features include an integral cooling unit and overload and line short circuit safeguards. New low prices on many H-VW-M Germanium models mean you can enjoy the benefits of this type, in some cases, for the same price you would pay for a comparable Selenium Rectifier.

RECTIFIER CONTROLS

H-VW-M offers a complete line of rectifier controls to provide for many control functions. Used with either selenium or germanium rectifiers, these controls, properly applied, permit the most efficient control possible. Such devices as manual and motor operated tap switch controls, continuously variable auto-transformers and saturable core reactors are used with or without supplemental controls to provide automatic voltage stabilization, automatic current stabilization as well as automatic programming. H-VW-M Bulletins ER-108 and ER-109 further explain economical H-VW-M Rectifiers and Controls. Write for it.

FULL AUTOMATIC CONVEYORS

For well over 30 years H-VW-M design engineers have worked continuously for improvements in the automatic conveyors for electroplating and allied operations in which H-VW-M pioneered.

Today's full-automatic conveyors are a far cry from the conveyors produced by H-VW-M as early as 1922. But one thing remains the same – and that is H-VW-M's desire to provide the most advanced and efficient equipment possible. Scores of innovations and improvements resulting from continuing H-VW-M research mean today's H-VW-M Full Automatic Conveyors offer the ultimate in service and efficiency for peak production of the highest quality at lowest cost.

DIAL-A-CYCLE CONTROL

Exemplifying the many H-VW-M developments contributing better, easier plating, is the remarkable new DIAL-A-CYCLE Control. This unique selective by-pass mechanism – of particular interest to aluminum anodizers – permits a whole series of different operations and cycles in one full automatic conveyor. Length of any treatment time can be varied, and, in anodizing, different colors can be anodized in one continuous operation, and in any sequence. It is a truly revolutionary device, resulting in remarkable labor savings and increased production.

AUTOMATIC LOAD-UNLOAD

Automatic Load and Unload is another recent development of H-VW-M that contributes to greater economies in the plating room. This new transfer unit, operating the same indexing sequence between plating conveyor and a monorail conveyor loads and unloads racks automatically. Manual handling is eliminated by this major advance towards automation in metal finishing.

This, of course, is just one of many types of conveying equipment offered to metal finishers. Return type conveyors, elevator conveyors, high-lift conveyors, straight line conveyors, and others – of every description are H-VW-M designed, manufactured and installed. If you'd like to know more about the cost-saving story of H-VW-M Full Automatic Conveyors, write for Bulletin FA-105.

metal finishing costs down

BUFFING AND CLEANING SUPPLIES

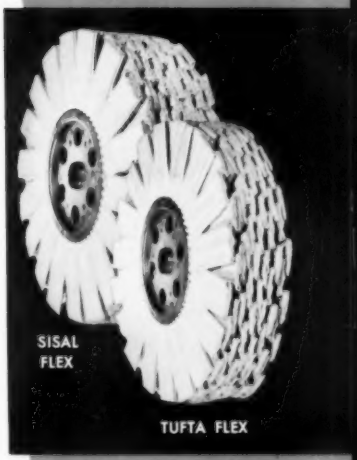
BUFFS

Tufta-Flex and Sisal-Flex Buffs

Speed and economy are embodied in two new H-VW-M Buffs for thorough cutting and coloring on contoured surfaces. For medium and heavy duty, SISAL-FLEX Buffs with sisal-cored tufts are available, and for light to medium duty, TUFTA-FLEX Buffs, having full cloth tufts, are offered.

Both buffs feature double-folded tufts for maximum cutting surface, and to retain compound on the leading edges and ends of the tufts. To prevent streaking, tufts are staggered in a double row around the buff. Cool running, a feature of both buffs, is the result of staggered tufts, plus a pattern of ventilating holes in the rugged steel center. Fraying, which is wasteful and expensive, is ruled out by the bias-cut construction of both cloth and sisal.

These time and cost-saving new buffs are available in standard diameters from 12 to 18 inches.



BINDERIZED® RUFF-L-BUFFS

"BINDERIZED" Ruff-L-Buffs are pre-treated with a high quality compound binder. Because every fibre is impregnated with the same binder used in buffing compounds, Binderized Ruff-L-Buffs are ready for operation at top efficiency from the very first piece.

The cost-saving advantages of Binderized Ruff-L-Buffs are many. "Heading-up" is eliminated, thus break-in time is radically reduced. Because of the natural affinity between the Binderized Ruff-L-Buffs and the compound, the compound lasts far longer, and is easier to apply. Naturally, much better cut is obtained because of the high amount of compound carried.

Perhaps the greatest advantage of Binderized Ruff-L-Buffs is their internal lubrication which prevents wear inside the buff (see photos). Wear is even—and up to 30% longer. To learn more about the unusual economies of Binderized Ruff-L-Buffs, write for Bulletin No. B-103.

Plain Ruff-L-Buff (below) after wearing off 1 inch in test. Loose threads, numerous holes and breaks due to excessive heat and abrasion are apparent.

Binderized Ruff-L-Buff (below) after same test. Notice absence of thread or cloth breakage, convincing proof of Binderizing's effect on buff life.

LIQUIMATIC COMPOUNDS

and application equipment

Buffs "live" up to 200% longer . . . No compound waste . . . Reduced labor costs . . . Fast cutting, easy cleaning—all these advantages and more are embodied in the unusual Liquimatic Liquid Compounds and application equipment.

Because of the enormous economies of using the Liquimatic System, the system soon pays for itself in buff, compound and labor savings.

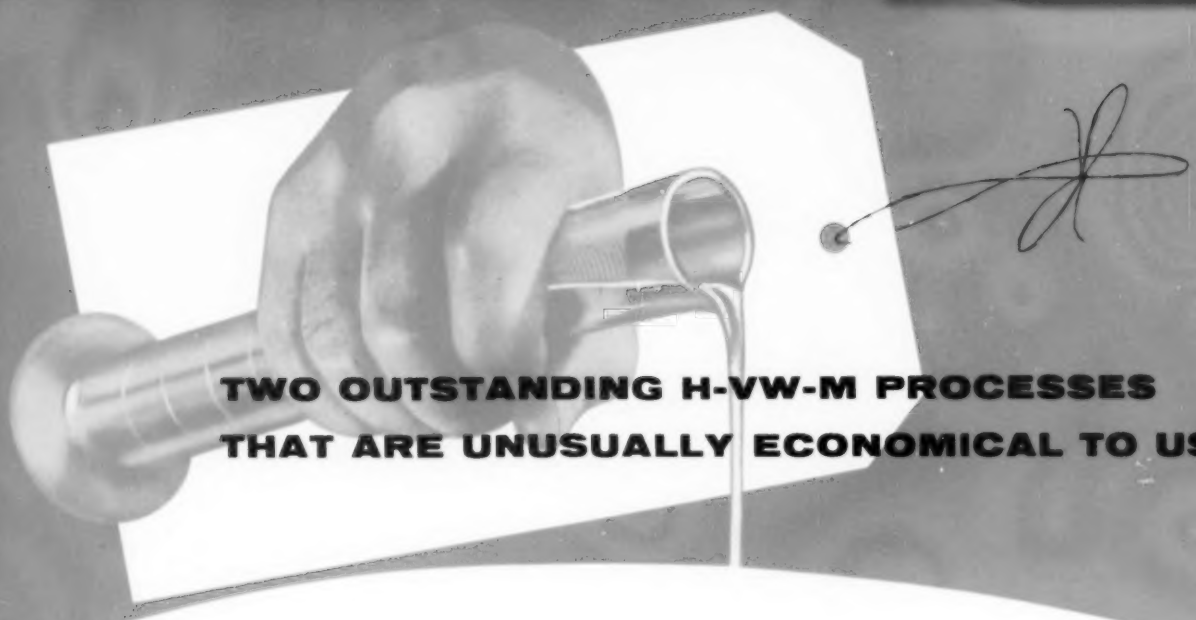
A complete line of Liquimatic Compounds is available for cutting and coloring ferrous and non-ferrous metals. These provide an adhesive, slow-wearing buff face, and have a high safety factor because of their high flash point. All are of sprayable viscosity, and have a long storage life. Write for H-VW-M Bulletin No. Co-103, which fully describes Liquimatic and other economical H-VW-M Compounds.

85-S ALUMINUM CLEANER

H-VW-M devotes constant research to the subject of cleaners and the result is a comprehensive line of Matawan Cleaners giving superior results in soak cleaning, power spray operations, oxide removal, and special cleaning and etching operations.

Of particular importance is H-VW-M's new 85-S Aluminum Cleaner, which offers interesting advantages to aluminum finishers. It prevents scale formation, for instance, thus keeping coil and tank walls scale free, and it leaves an extremely bright surface. Its built-in regenerator makes maximum effective use of caustic in the bath.

H-VW-M Bulletin C-108 tells about this unusual cleaner, and other Matawan Cleaners offering unusual money-saving advantages.



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H-VW-M's new LEVELUME represents a milestone in nickel plating processes. It is the first bright nickel process to combine qualities of full brightness, high leveling and exceptional speed. In high-production installations, deposition rates with LEVELUME are 100% higher than those obtained with any other process, but will require some air agitation equipment.

Conversion to Levelume is simple, involving no new investment in conveyors, or tanks.

Key to the new process are its addition agents. With them an activated carbon pack can be used in the plating solution filter. This constantly removes harmful organic contamiments, preserving the purity of the bath, and consequently contributing to the economy of the process.

A few of the additional benefits include high surface activity, good ductility, controlled stress, and the feasibility of double coatings. A full description of the process—one in the family of NICKELUME processes—is available in the Levelume Manual, which is available on request.

CADALUME

Bright, uniform attractive cadmium deposits are obtained with Cadalume—a new, clear, low-cost bath which makes bright dips unnecessary. With the process, ferrous parts are protected against corrosion and non-ferrous parts against surface tarnish, corrosion or galvanic couples formed in assemblies.

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Conversion to Cadalume is simple and low cost. Method of conversion plus more facts about this superior new cadmium process, are contained in the H-VW-M Cadalume Technical Manual, which is available without cost.

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All material is alphabetically arranged, first as to formulas of the reactants and next as to reagents. Explanatory paragraphs describe the conditions governing each reaction (color, odor, crystal form, yield, etc.); equations showing the progress and other pertinent data. Easy to use indexes quickly help locate both the reagents and the compounds formed.

The five volumes preceding this one:

VOLUME I

Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Bromine.

1946, 804 pages, 3000 reactions, $15.00, AES Members $13.75.

VOLUME II

Cadmium, Calcium, Carbon, Cerium, Cesium, Chlorine and Chromium.

1948, 927 pages, 3325 reactions, $17.50, AES Members $14.85.

VOLUME III

Cobalt, Columbium, Copper, Didymium, Dysprosium, Erbium, Europium, Fluorine, Gadolinium, Gallium, Germanium, Gold, Hafnium, Holmium, Hydrogen, Illinium, Indium, Iodine, Iridium.

1949, 800 pages, 2757 reactions, $17.50, AES Members $14.85.

VOLUME IV

Iron, Lanthanum, Lead, Lithium, Magnesium, Manganese, Mercury, Molybdenum, Neodymium.

1951, 750 pages, 3000 reactions, $17.50, AES Members $14.85.

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PATENT ABSTRACTS

DR. D. GARDNER FOULKE
Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,738,321, March 13, 1956—Apparatus for Automatically Conveying and Immersing Articles—V. Finston, assignor to the Meaker Co., Chicago, Ill.

The machine is claimed to convey carriers in an equally spaced apart relationship irrespective of position of the elevator, to provide guides to constrain work holders to a vertical movement relative to conveyor, is controlled to advance carriers a relatively short distance in rinse baths and a longer distance in plating bath as well as 3 or 4 other objectives.

16 claims, 22 figures.

—AES—

No. 2,738,888, March 20, 1956—Processing Machinery for Electroplating and the Like—G. Todd and P. Hauck, assignors to Hanson-Van Winkle-Munning Co., Matawan, N. J.

This conveyor is claimed to permit work pieces (racks) to remain longer at some stations than others and a sensing means is provided to remove racks from various stations to another, such as the rinse after plating, depending upon the plating time required, in a skip-stop fashion.

8 claims, 10 figures.

—AES—

No. 2,739,047, March 20, 1956—Process of Chemically Milling Structural Shapes—Manuel Sanz, assignor to North American Aviation, Inc., Los Angeles, Cal.

A method is claimed for producing a high strength-to-weight ratio thin walled panel structure with predetermined raised reinforcing areas by masking and chemically etching the metal to provide the non-reinforcing areas. Tolerances of order of ± 0.002 inch are claimed. No disclosure of typical solutions are given and the invention is therefore not limited to any type of chemical etchant.

10 claims, 7 figures.

—AES—

No. 2,739,107, March 20, 1956—Applying Protective Coatings on Refractory Metals—H. Richs, assignor to Westinghouse Electric Corp., E. Pittsburgh, Pa.

Claim 1 states: ". . . a body of molybdenum and an imperforate coating of a thickness of the order of 0.001 inch applied to the entire surface of the body, the coating comprising essentially over 85 per cent by weight of cobalt and nickel and the balance being phosphorous . . ." The applied coating is melted at from 600°–1100° C to diffuse into the molybdenum. The metal phosphide coating may be done by plating, eg using a bath.

Nickel sulfate	30 oz/gal
Nickel chloride	7
Boric acid	4
Nickel phosphite	5

at a *p*H of 0.7, temperature of 75° C at 35 asf.

6 claims, 2 figures.

No. 2,739,111, March 20, 1956—Metal Production by Electrolysis—R. Nolan and C. Marzano, assignors to the U. S. Atomic Energy Commission.

Actinide metal (uranium and thorium) containing carbon can be freed to a great extent of the impurity by electrolyzing in a fused bath (385–425° C) consisting of 5–50 per cent of the actinide metal tetrafluoride and 95–50 per cent of lithium chloride-potassium chloride eutectic.

6 claims.

—AES—

No. 2,739,117, March 20, 1956—Electroplating Fixture—H. Luechauer and A. Erickson, assignors to General Motors Corp., Detroit, Mich.

A rack or fixture is described for holding a number of semicircular bearings in a stacked relationship, spaced substantially equidistant from the anode.

3 claims, 8 figures.

—AES—

No. 2,739,883, March 27, 1956—Process of Etching Aluminum—K. Newman, assignor to Turco Products, Inc., Los Angeles, Cal.

To prevent the formation of adherent scale on aluminum etching solution (caustic soda) tanks, coils and the like the use of at least 2.7 per cent of citric acid in the etchant is claimed useful. Claim 6 covers NH_4, NaOH and KOH with citric acid, ammonium citrate, potassium citrate and sodium citrate in the ratio of 97.3 to 90 parts by weight of alkali and 2.7–10 parts by weight of citric acid.

5 claims.

—AES—

No. 2,739,907, March 27, 1956—Process for Improving the Surface Finish of Metals—R. Nowak, Waldbrol—Hermesdorf, Germany.

The process is described as imparting an improved finish to base metal (Fe, Cu, Sn) by contacting with a vaporized halide of a polyvalent element capable of replacing the base metal at the surface (Si, Ti, Cr, Sn). The operation may be done after oxidizing and reducing the base metal or under the influence of supersonic waves.

(6 claims)

—AES—

No. 2,739,931, March 27, 1956—Anodizing Metal Articles—E. Bernstiel, assignor to Rhondda Plating Works, Ltd., Glamorgan, Wales.

Equipment for anodizing slide fasteners (zippers) are described to overcome limitations imposed by using wires, at the edges of tapes resulting in low current carrying capacity.

(17 claims, 4 figures)

—AES—

No. 2,739,932, March 27, 1956—Electrodepositing Chromium on Aluminum—C. Forestek, Cleveland, Ohio.

The method consists of depositing an immersion zincate film on the aluminum which is removed and a chromium film simultaneously deposited thereon from a chromic acid (40–60 oz/gal)—sulfuric acid (0.4–0.6 oz/gal) bath at 90°–120° F. Claim 6 covers an initial current density of 4–6 asi which is later reduced to 1–4 asi.

(6 claims)

—AES—

No. 2,739,933, March 27, 1956—Electrodeposition of Ternary Alloys—M. Ceresa, assignor to Westinghouse Electric Corp., E. Pittsburgh, Pa.

The process deposits a ternary alloy of 50–75 per cent copper, 15–35 per cent tin and 5–20 per cent zinc from an aqueous alkali cyanide bath containing 0.005–0.5 oz/gal of 1-acetyl-2-thiohydantoin. Claim 2 covers the additional use of 0.03–03.0 oz/gal of molybdic acid.

(7 claims)

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Can he take it? Can he stand up physically to the new job? Who knows? Frequently, we can't tell until it's too late.

The basic solution, I'm convinced, is to prolong executive "brain power" by re-distributing the load. Most important, that load—especially everything that can be classified as "administrative detail"—should be delegated earlier, much earlier, to the junior group. And the junior executive, in turn, should gradually shift detail to his own promising young men.

Of course, the younger man cannot be overloaded. We only want to bend the twig . . . not break it! Nevertheless, if we are to conserve our nation's executive "brain power" for top-level planning and direction, we must delegate responsibility downward, earlier and on a broader basis. That way, we conserve at every state of development.

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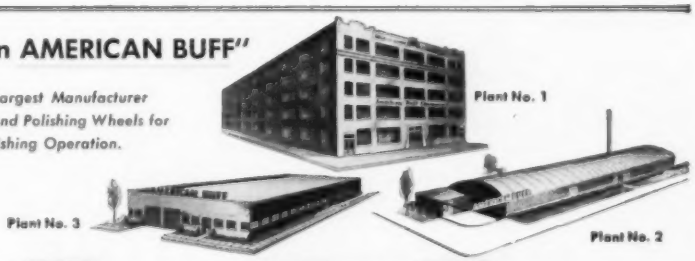

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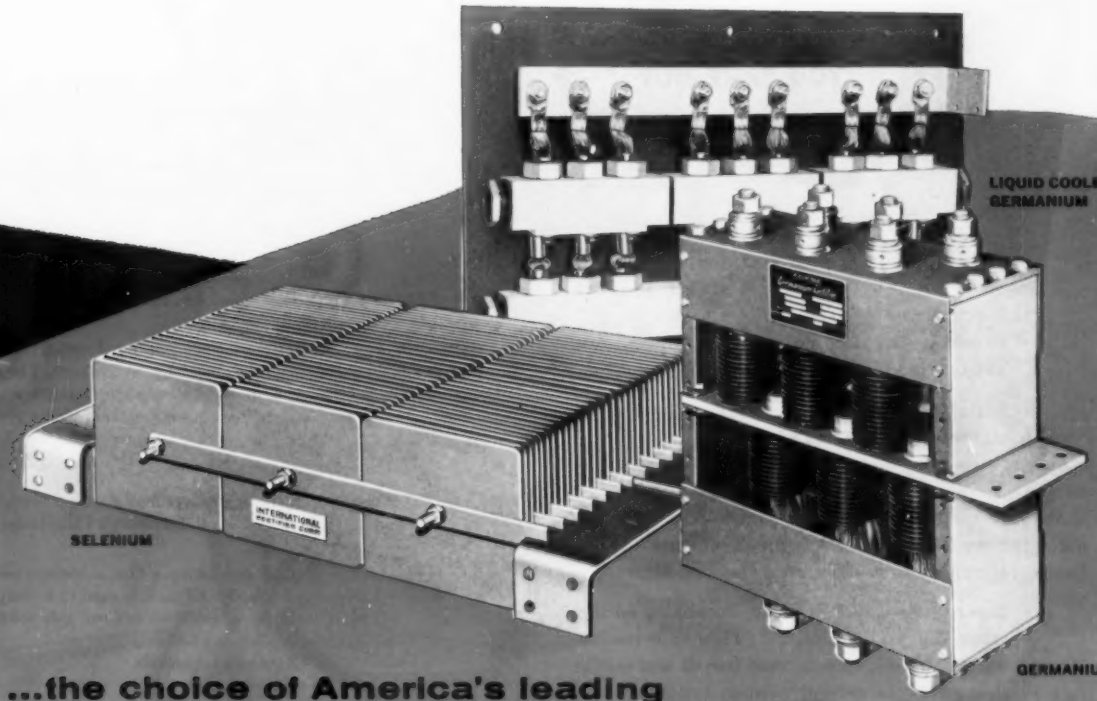

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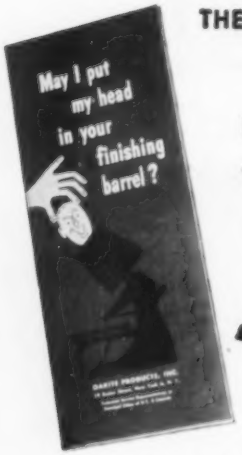

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PATENT ABSTRACTS

No. 2,739,935, March 27, 1956—Electrolytic Cutting of Metals—G. Kehl and L. Moch, assignors to the United States (Atomic Energy Commission).

The method consists of supplying electrolyte to the metal to be cut and an electric current to the area to be cut through a cathodic cutting electrode. An auxiliary voltage is supplied to electrodes near the region to be cut to draw at least a portion of the supplied current diverging from said region through the electrolyte.

(9 claims, 3 figures)

—AES—

No. 2,739,937, March 27, 1956—Aligned Anode Apparatus—C. Forestik, Cleveland, Ohio.

An apparatus for positioning anodes at a given spaced distance from the cathode, thereby eliminating manual adjustment is described in 4 claims and 12 figures.

—AES—

No. 2,740,191, April 3, 1956—Manufacture of Plated Powdered Metal Articles—J. Kusmick, assignor to Ekstrand and Tholand, Inc., New York, N. Y.

After forming the metal body from powdered metal the body is plated with another metal substantially on surface. The plating is followed by heat treating to improve the strength and remove residual salts. Claim 7 mentions copper and nickel plating.

(7 claims, 2 figures)

—AES—

No. 2,740,731, April 3, 1956—Electroconductive Article—W. Lytle and A. Junge, assignors to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

The method depends upon depositing a film of indium salt on the transparent refractory (glass). Glass is heated to a temperature above 400° F, then sprayed with an indium salt solution. Example III gives the composition of the solution as.

170 cc indium trichloride
1000 cc methanol
6 g ammonium bifluoride

(10 claims)

—AES—

No. 2,740,754, April 3, 1956—Zinc Plating Brightener—R. Hoffman, assignor to Allied Research Products, Inc., Baltimore, Md.

Additions to a cyanide zinc bath consist of 0.001 to 0.0035 per cent by dry weight of an aqueous solution containing 44–60 per cent anisic aldehyde bisulfite, 10–24 per cent ground glue, 8–12 per cent polyvinyl alcohol and 8–20 per cent of sodium lignin sulfonate.

(9 claims)

—AES—

No. 2,740,755, April 3, 1956—Electropolishing with Phosphorous Acid—D. Couch and A. Brenner, assignors to U.S.A. (Dept. Commerce).

An electropolishing bath for Al, Cu, Ag, Mo, Zn, Cd, Ni, brass and stainless steel consists of 60–100 per cent phosphorous acid. The current density may be 5–100 amperes per square decimeter.

(7 claims).

—AES—

No. 2,741,051, April 10, 1956—Process for Controlling Scale Formation in Aluminum Etching—W. Reicsig, assignor to Allied Chemical and Dye Corp., N. Y.

To prevent scale formation the use of sodium lignosulfonate is described. The amount claimed is 0.5–5.0 per cent the weight of the caustic in the bath.

(4 claims)

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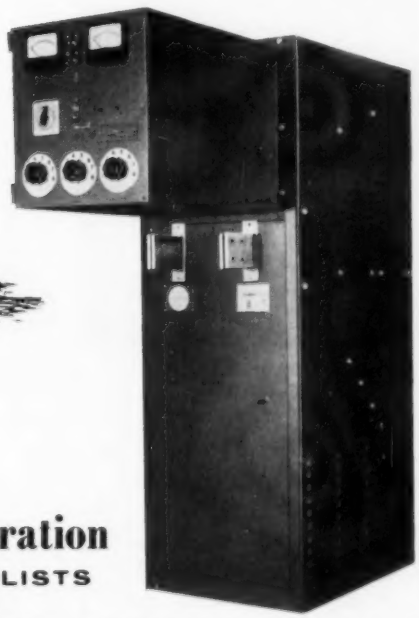

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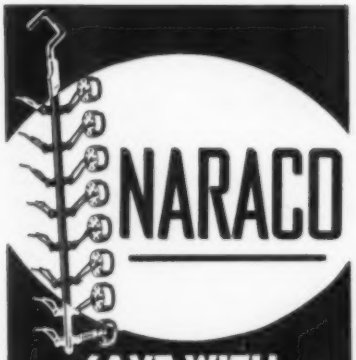

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ARTICLE REFERENCES

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WILLIAM TUCKER
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Most of the articles listed here may be obtained by writing to the Publication. Addresses are included for the reader's convenience.

Photostat or microfilm copies of articles in available magazines may be obtained from: Library of Congress, Washington, D. C.; New York Public Library, New York; Engineering Societies' Library, New York, at prevailing rates. In other cases, consult Wilson's Union List of Serials at your nearest public library for other sources of these articles.

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119. ALUMINUM

a. *INFLUENCE OF ANODIZING VARIABLES ON THE GROWTH AND VARIOUS PROPERTIES OF THE OXIDE FILM* (*German*).

D. Lenz.

Aluminum, *32*, No. 4, April 1956, p. 190–201.

Factors which determine the chemical stability of the film, such as the nature of the corroding medium, the material, the film structure and thickness and sealing; compares bohmite films with anodically produced oxide films. Photographs, graphs, table, micrographs, 23 ref.

b. *SURFACE TREATMENT AND FINISHING OF LIGHT METALS. PART VIII. HARD ANODIZING.*

S. Wernick and R. Pinner.

Metal Finishing, *54*, No. 6, June 1956, p. 82–87.

120. CHEMICAL POLISHING

a. *MECHANISM OF ELECTROLYTIC AND CHEMICAL POLISHING OF METALS, ESPECIALLY OF NICKEL.*

Willi Machu and Adly Ragheb.

Zeitschrift für Metallkunde, *47*, No. 3, March 1956, p. 176–183.

121. CHROMIUM

a. *CHROMIUM PLATING ON TIN-BASE DIE CASTINGS.*

Tin and Its Uses, 1956, No. 34, p. 4,

Method for preparing and nickel plating die castings made from an alloy of 90 per cent tin, 8½ per cent antimony, 1½ per cent copper so that peeling of chromium plating is prevented.

122. CORROSION

a. *CORROSION PROBLEMS ON THE TEXAS GULF COAST. PART ONE.*

A. D. Rust.

Corrosion Technology, *3*, No. 5, May 1956, p. 134–137.

b. *LANOLIN—AS A TEMPORARY PROTECTIVE.*

H. Silman.

Corrosion Technology, *3*, No. 5, May 1956, p. 138–140.

c. *A SYSTEMATIC SCHEME FOR EXAMINING CORRODED METAL SPECIMENS.*

J. B. Cotton.

Corrosion Technology, *3*, No. 5, May 1956, p. 141–145.

d. *GALVANIC POTENTIALS OF GRAINS AND GRAIN BOUNDARIES IN COPPER ALLOYS.*

R. Bakish and W. D. Robertson.

Journal of the Electrochemical Society, *103*, No. 6, June 1956, p. 320–325.

e. *VOLATILE CORROSION INHIBITORS.*

A. B. Cox and E. C. Kuster.

Corrosion Prevention and Control, *3*, April 1956, p. 98–128, 148.

f. *STUDIES IN CORROSION.*

G. H. Cartledge.

Scientific American, *194*, May 1956, p. 35–40.

Technetium, the synthetic element found in the products of uranium fission, strongly inhibits the oxidation of iron. This phenomenon suggests a new explanation for the action of corrosion inhibitors. Photographs, diagrams, micrograph, radiograph.

123. COSTS

a. *COST FACTORS GOVERNING BUFF SELECTION.*

Edwin Doyle.

Metal Finishing, *54*, No. 6, June 1956, p. 75–76.

124. DESCALING

a. *SODIUM HYDRIDE DESCALING.*

C. Fred Gurnham.

Products Finishing, June 1956, p. 86–100.

125. ELECTROPLATING

a. *ELECTROPLATING ON ZIRCONIUM USING REPLACEMENT INDIUM DEPOSITS.*

W. C. Schickner, J. G. Beach and C. L. Faust.

Battelle Memorial Institute (U.S. Atomic Energy Commission), BMI-809, February 1953, 15 p.

126. EXHIBITION

a. *BRITISH INDUSTRIES FAIR 1956.*

Electroplating and Metal Finishing, *9*, No. 6, p. 190–197, June 1956.

127. FINISHING
a. *STANDARDIZED BARREL TUMBLING PAYS OFF.*
The Iron Age, *177*, No. 25, June 21, 1956, p. 115–117.

128. INHIBITION
a. *INHIBITION OF IRON DISSOLUTION IN ACID SOLUTIONS.*
Cecil V. King and Eric Rau.
Journal of the Electrochemical Society, *103*, No. 6, June 1956, p. 331–336.

129. ORGANIC COATINGS
a. *PLASTISOL COATING OF WIRE PRODUCTS.*
Gerard H. Poll, Jr.
Products Finishing, June 1956, p. 66–72.

130. PROCESS CONTROL
a. *PROCESS CONTROL IN THE PLATING SHOP.*
K. E. Langford.
Electroplating and Metal Finishing, *9*, No. 6, June 1956, p. 177–182.

131. PURIFICATION
a. *REFINING OF PLATINUM AND RHODIUM BY AN ION EXCHANGE PROCESS.*
Charles K. Butler.
Industrial and Engineering Chemistry, *48*, April 1956, p. 711–713.

132. SAFETY
a. *HAZARDS AND PROTECTIVE EQUIPMENT IN ELECTROSTATIC SPRAY PAINTING.*
Ing. S. Buchkremer.
Electroplating and Metal Finishing, *9*, No. 6, June 1956, p. 183–186.

133. VENTILATION
a. *VENTILATION.*
J. B. Mohler.
Metal Finishing, *54*, No. 6, June 1956, p. 77–80.

Following are the addresses of the publications named in the Article Reference above.

Requests for articles should be made directly to the publication.

Battelle Memorial Institute
505 King Avenue
Columbus 1, Ohio

Electroplating & Metal Finishing
85 Udney Park Rd.
Teddington, Middlesex, England

Industrial and Engineering Chemistry
American Chemical Society
1155 Sixteenth St., N.W.
Washington 6, D. C.

Iron Age
100 E. 42nd St.
New York 17, N. Y.

Journal Electrochemical Society
216 W. 102nd St.
New York

Metal Finishing
381 Broadway
Westwood, N. J.

Product Finishing
431 Main St.
Cincinnati 2, Ohio

Scientific American
2 West 45th St.
New York 36

Tin & Its Uses
International Tin Study Group
7 Carel van Bylandtlaan
The Hague, Netherlands

Zeitschrift fur Metallkunde
Dr. Riederer-Verlag GmbH
Stuttgart S
Marienstr 50
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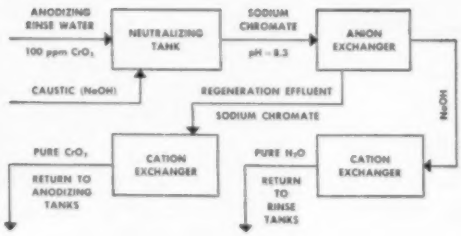

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25 Years Ago

The August 1931 issue of the "Monthly Review" contained 26 pages with covers. The editorial deals with the President and the retiring President and pays tribute to Philip Sievering. His work as Secretary-Treasurer of the Research Committee is applauded and the loyal support of the membership is assured him as he takes up the important duties of the presidency.

The same editorial salutes George Gehling, who became a Past President. The members of the Executive Board take this opportunity to thank him for his close cooperation during the past year. There is a half page of convention notes and 2 pages devoted to a thumbnail biography to our new President, Philip Sievering, and a letter from him to the members.

The articles in the issue are "Electroplating on Cold Rolled Steel" by G. B. Hogaboom; "The Bullard-Dunn Process of Cleaning" by F. T. Taylor. The issue contained 1½ pages of Branch News, a full page of bold-face filler, one page of Branch Directory and two blank cover pages.

10 Years Ago

The August 1946 issue of "Monthly Review" contained 45 pages of advertising and articles by E. W. Wells on "Buffing and Polishing"; F. A. Patty on "Environmental Control of Metal Cleaning Processes"; W. H. Adams, Jr. on "Furan Resins in the Plating Industry." There was a continuation of a presentation of the abstracts of papers presented at the 33rd Annual Convention (considered from the July issue.) Strongly prominent in this issue is a department called "Patents" written by G. B. Hogaboom. Branch News covered 4 pages. All in all, a balanced issue with far more editorial than advertising.

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INTERSOCIETY NEWS

NEW OFFICERS OF NAMF FOR 1956-'57

On June 18 in Washington, D. C., the National Association of Metal Finishers reelected John Palik of Cleveland to serve as President for a second consecutive year. J. Robert Greenwell of Chicago will serve as 1st Vice-President; Webb B. Knight of Detroit, 2nd Vice-President; Frank Kaiser of Long Island, Secretary-Treasurer; and Sal Novelli of Brooklyn, Assistant Secretary-Treasurer. At the same meeting, President Palik announced that P. Peter Kovatis of Cedar Grove, N. J., formerly Executive Secretary of the AES, had been named Executive Secretary of the NAMF.

UMA COMMITTEE ON STANDARDS

The Ultrasonic Manufacturers Association has announced the formation of its Engineering Standards Committee. Composed of members from 17 leading ultrasonic manufacturers in the United States, this committee has been established to formulate engineering standards and practices for this new and rapidly growing industry.

The members of this group represent firms whose equipment is finding rapid acceptance in ultrasonic degreasing and cleaning, electroplating, ultrasonic soldering and welding, ultrasonic materials inspection, ultrasonic machining and drilling, ultrasonic medical therapy, and ultrasonic thickness and viscosity measurements. The Engineering Standards Committee of the Ultrasonic Manufacturers Association intends to establish a uniform and coherent system of engineering, terminology and systems of units so as to unify engineering and manufacturing practices in the ultrasonic industry.

The firms participating in this new and highly important committee of the Ultrasonic Manufacturers Association include:

Acoustica Associates, Inc., Aeroprojects Incorporated, Alcar Instruments, Inc., The Birtcher Corporation, Blackstone Corporation, Bodine Soundrive Company, Branson Ultrasonic Company, Cavitron Equipment Corporation, Curtiss-Wright Corporation, Detrex Corporation, General Ultrasonics Company, Walter Kidde & Company, Inc., Photocon Research Products, The Sheffield Corporation, Solar Manufacturing Corporation, Sperry Products, Inc., Vibro-Ceramics Corporation.

ASTM AWARDS OF MERIT

Eleven technical leaders in the field of engineering materials—men who have rendered outstanding service to the American Society for Testing Materials particularly in its technical committee work—were honored during the ASTM 59th Annual Meeting in Atlantic City the week of June 17 when they received Awards of Merit.

To **L. Drew Betz,** Managing Director, W. H. & L. D. Betz, Philadelphia, Pa., in recognition of valued and constructive contributions in various ASTM areas, notably in the field of industrial water and in District activities, and for sustained support of other Society work.

To **Harry Aaron Bright,** Chief, Analytical Chemistry Section, Division of Chemistry, National Bureau of Standards, Washington, D. C., in recognition of notable service in developing and standardizing methods for the chemical analysis of metals, and for his consistent administrative and technical support of Committee E-3.

To **Simon Collier,** Director of Quality Control, Johns-Manville Corporation, New York, in recognition of sustained support of ASTM technical and administrative work particularly in Committee D-11 on Rubber and Rubber-Like Materials where as a long-time member and Chairman since 1944 his knowledge and understanding have been so effective.

To **William LaVilla Fink,** Chief, Physical Metallurgy Division, Aluminum Company of America, Alumnium Research Laboratories, New Kensington, Pa., in recognition of long-time constructive work, especially in the field of metallography, for outstanding service in Committee E-4 on Metallography, and for notable contributions in the area of X-ray diffraction.

To **Harrison Frederick Gonnerman,** Consulting Engineer and Research Consultant, Oak Park, Illinois, in recognition of outstanding service, especially for standards and research work in Committee C-1 on Cement, and in the field of concrete, and for consistent support of other varied ASTM activities.

To **Bruce W. Gonser,** Assistant Director, Battelle Memorial Institute, Columbus, Ohio, in recognition of significant leadership in standardization and research work, especially covering non-ferrous metals and alloys, and for valued support of ASTM research activities.

To **Fred Hubbard,** Consulting Engineer, The Standard Slag Co., Youngstown, Ohio, in recognition of distinguished and long-time service to the Society, especially in Committee D-4 on Road and Paving Materials, and for support of other important ASTM work.

To **Roland P. Kochring,** Section Engineer for Research and Development, Moraine Products Division, General Motors Corporation, Dayton, Ohio, in recognition of valued service to the Society, particularly leadership and support of standards and research work in Committee B-9 on Metal Powders and Metal Powder Products.

To **Vincent T. Malcolm,** Consultant and Advisory Engineer, The Chapman Valve Manufacturing Co., Indian Orchard, Mass., in recognition of long-time consistent support of many standardization and research projects, notably in the fields of ferrous and non-ferrous metals, and for constructive work on the effects of temperature on metals.

To **John W. McBurney,** (Retired) Consultant on Masonry and Masonry Materials, National Bureau of Standards, Washington, D. C., in recognition of long-time sustained work in the field of building materials, particularly in Committee C-12 on Mortars for Unit Masonry, and C-15 on Manufactured Masonry Units.

To **Harry Roscoe Wolf,** (Retired) Exexutive Department, Research Laboratories Division, General Motors Corporation; Consultant to Fuels and Lubricants Department, in recognition of long-time valued service to the Society, especially supporting standardization and research work in Committee D-2 on Petroleum Products and Lubricants, and as Charter Chairman of Committee D-15 on Engine Antifreezes.*

*Due to H. R. Wolf's protracted illness, his Award was presented to him prior to the Annual Meeting.

FIVE-WAY TIE IN MFSA GOLF TOURNAMENT

Using the Calloway Handicap system, five contestants tied for low net honors with 72's: Phil Borell, Allied Research; Miss Jean Conner, National Bureau of Standards; Joe Eisele, Enthone; Bill Innes, MacDermid, Inc.; and Ed Mahar, Glidden Company. Displaying a well balanced game, Joe Wagner of Wagner Brothers carded a 78 to lead the field in low gross scores in the 1956 MFSA Golf Tournament. Each received a handsome prize.

Scheduled for June 19 in conjunction with the AES Convention in Washington, this year's event was held on the Manor Country Club course at Norbeck, Maryland. Joe Duffy, Pennsalt, served as Tournament Director. The entry list topped all previous tourneys.

WIN JOURNAL OF METALS AWARD

The American Institute of Metallurgical Engineers has awarded the 1956 Journal of Metals Award to Dr. Richard D. Burlingame, a chemical engineer in the central research division of Cargill, Inc.

The Journal of Metals Award is presented each year by AIME to the research worker whose paper is judged the most outstanding of those submitted to the annual meeting of the organization. Dr. Burlingame's paper, on the processing of low-grade taconite ore, was featured in the June issue of The Journal of Metals.

ELECTROPLATING PRACTICES SYMPOSIUM

A part of the ASTM National West Coast Meeting in the Hotel Statler in Los Angeles, September 16–22 will be the Electroplating Practices Symposium.

The chairman of the Symposium will be Walter L. Pinner, Houdaille Industries, Detroit, Mich. The meeting itself will feature 11 papers:

History of Committee B8, Dr. William Blum, National Bureau of Standards

Corrosion Behavior and Protective Value of Decorative Copper, Nickel and Chrome, and Nickel and Chrome Coatings on Steel, Clarence H. Sample, International Nickel Co. (Chairman, Comm. B8).

Evaluation of Available Methods for Measurement of Surface Lustre in Plated Coatings, Glade Bowman, Rockwell Spring.

Metal Cleaning Prior to Electroplating, Dr. Sam Spring, Penna. Salt Mfg. Co.

The Utilization of Radioactive Isotopes and/or Radio Barium for Determining Sulfate Concentration in Chromium Plating Baths, Lloyd O. Gilbert, Rock Island Arsenal.

Comparison of Corrosion Behavior and Protective Value of Electrodeposited Zinc and Cadmium Coatings on Steel, Clarence H. Sample, R. B. Tell, International Nickel Co.

Evaluation of Supplementary Conversion Coatings on Zinc and Cadmium, Dr. R. E. Harr, Western Electric Co.

Atmospheric Exposure of Electroplated Lead Coatings on Steel, A. H. DuRose, Harshaw Chemical Co.

The Standard Salt Spray Test—Is it a Valid Acceptance Test?, A. Mendizza.

The Performance in Salt Spray (20 Per Cent) of Phosphate Films on Electrodeposited Zinc Coatings, Dr. Allen L. Alexander, U. S. Navy Res. Labs.

Radioactive Isotope Dilution Method for Determination of Sulfate Concentration in Chromium Plating Baths, Lloyd O. Gilbert, Chief Metal Finishes Division, Rock Island Arsenal.

Of additional interest to AES members will be the Industrial Water Symposium conducted by Committee D-19 under the chairmanship of L. Drew Betz. The papers for that symposium will be:

The First Quarter Century, Robert C. Adams, U.S. Navy Eng. Experiment Station, Annapolis, Md.

Industrial Waste Problems in So. California T. C. Wilson, L.A. Bureau of Standards.

Sea Water Purification, O. M. Elliott, Sun Oil Co., Phila., Penna.

Water Pollution Control in the L. A. Area, Carl B. Johnston, Regional Water Control Bd. No. 4, L. A.

New Methods for Handling Plating Room Wastes. W. S. Morrison, Ill. Water Treatment Co., Rockford, Ill.

The Use of Organic Flocculants In the Treatment of Industrial Water and Wastes, J. K. Rice, Cyrus Wm. Rice & Co., Pittsburgh, Penna.

Recent Developments in Water Technology for Nuclear Reactors of Pressurized Water Type, James S. Seamon, National Aluminate Co., Chicago, Illinois.

TEN ORGANIZATIONS UNITE FOR METHODS REVIEW

Nine organizations became charter members of a new Joint Committee on Uniformity of Methods of Water Examination at a meeting in Biloxi, Miss., on January 26, 1956. Since that date, another has joined the group. The harmony and agreement of thought reached at this meeting opened the door to the establishment of close cooperation among the principal organizations that prepare, adopt, and publish for general public distribution water examination methods which are in general use.

The recommendations of this committee will be advisory only and will not supplant or impede the work and publication policies of any participating interest.

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INTERSOCIETY NEWS

The purpose of the committee is to secure uniformity of content of these methods by providing a mechanism for exchanging information among member organizations; securing uniformity of terminology; and reviewing methods with respect to objectives, sampling, apparatus and reagents, procedure, reporting of results, and application. The methods reviewed will include those covering natural water, potable water, industrial water, industrial waste water, and sewage.

ASTM ANNOUNCES NEW OFFICERS 1956-57

The ASTM elected officers for the year 1956–57 at Atlantic City during their fifty-ninth annual meeting which took place June 17–22.

ASTM President (Term: One Year)
Rudolph A. Schatzel, Vice-President & Director of Engineering, Rome Cable Corporation.

ASTM Vice-President (Term: Two Years)
Kenneth B. Woods, Head, School of Engineering and Director, Joint Highway Research Project, Purdue University.

ASTM Director (Term: Three Years)
Miles N. Clair, President, The Thompson & Lichtner Co., Inc.

ASTM Director (Term: Three Years)
Howard C. Cross, Assistant Technical Coordination Director, Battelle Memorial Institute.

ASTM Director (Term: Three Years)
George H. Harnden, Consultant, Materials and Processes Engineering Standards Service, General Electric Co.

ASTM Director (Term: Three Years)
R. R. Litehiser, Engineer of Tests, Ohio State Highway Testing Laboratory.

ASTM Director (Term: Three Years)
Charles R. Stock, Senior Group Leader, Physical Measurements Labs., American Cyanamid Co.

September 16-22, 1956

ASTM
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West Coast Meeting

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1—2000/1000 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE-MUNNING**.
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1—1500/750 AMPERE, 12/24 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
1—1000/500 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS**.

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Ezra Blount Installs the New Officers

CONVENTION ECHOES

A Record of the 43rd Annual AES Convention

(All Pictures by Plating Staff)

Pres. Kelly congratulates Honorary Member T. Trumbour

Honorary Member R. Hazucha addresses the Supreme Society

Mrs. F. Marquardt shows the Silver presented her on the 20th anniversary of her service with the AES

On the third day of the 43rd Annual Convention of the AES, registration reached a total of 1498. As a technical meeting, it has no parallel in AES history while the social side does great credit to the Baltimore-Washington Branch, its officers and committee workers. To Arthur G. Pierdon, General Chairman and Kenneth Huston Co-chairman; to Mrs. Arthur Pierdon, Ladies' Program Chairman and to the combined committees go the much deserved thanks and praise for a job well done.

On Sunday, June 17, there was only an Executive Board meeting scheduled. The registrations in the hotels rose swiftly so that the AES "Get Together Party," which took place in the Federal and South American rooms of the Statler Hotel, was a resounding success.

The Convention itself was called to order on Monday morning by General Chairman Arthur Pierdon with the Reverend F. C. Mesle (Rochester Branch) pronouncing the invocation. The keynote speaker was Dr. A. V. Astin, Director, National Bureau of Standards who delivered an address on "Process Control Through Automation." At the same meeting, the Society welcomed its new Executive Secretary, John P. Nichols.

Brief welcoming addresses were also given by Jules Horelick, President, Baltimore-Washington Branch, Mrs. Arthur Pierdon, Chairman, Ladies' Committee and Dr. William Blum, Honorary Chairman.

President Clyde Kelly called the formal business session to order. Forty-one branches were represented by 78 Delegates and 29 Alternates. The Necrology honored the memory of the 48 deceased individuals of 25 branches including one member-at-large.

President Kelly appointed the following members to the Research Committee: Leslie Diveley, Cutler-Hammer, Inc.; R. Harr, Western Electric; Leland Morse, Chrysler Corporation. President Kelly further announced the new Editorial Board members: W. Tucker, Eastman Kodak Co.; Dr. Abner Brenner, National Bureau of Standards; L. Doughty, Lea Manufacturing Co.

FINAL BUSINESS SESSION

President Clyde Kelly opened the final business session of the Supreme Society at 2 P.M. in the Federal Room on Thursday. After the roll call of National Officers and Delegates by the Executive Secretary, a lively meeting got underway.

AWARDS

The Carl E. Heussner Award was won by Dr. Charles L. Faust and Wm. H. Safranek of Battelle Memorial Institute, Columbus, Ohio, for their paper on "The Study of Copper Anodes in Acid and Cyanide Plating Baths."

Eddy, Schaefer and Candee Talk

The AES Bronze Medal Award was presented to R. V. Vanden Berg of the Aluminum Company of America, New Kensington, Pa., for his paper on "The Commercial Anodizing Surface Treatments for Aluminum and Its Alloys."

The George B. Hogaboom Memorial Award was won by J. J. Shyne, Reaction Motors, Inc., Denville, N. J.; H. N. Barr, Glenn L. Martin Co., Baltimore, Md.; H. G. Scheible, Vitro Lab., Div. of Vitro Corp., West Orange, N. J., and W. D. Fletcher, Eglin Airforce Base, Florida for their article on "Electrophoretic Deposition of Metallic and Composite Coatings."

The Chromium Plating Award was won by Dr. J. E. Stareck, Dr. E. J. Seyb and A. C. Tulumello of the Research Laboratories of United Chromium, Inc., Detroit, Michigan, for their article on "The Effect of Different Chromium Deposits on the Fatigue Strength of Hardened Steel."

The Precious Metal Plating Award was presented to Dr. Harold J. Wiesner and H. A. Meers of Bendix Products Div., Bendix Aviation Corp., South Bend, Indiana, for their article on "Further Studies in Heavy Rhodium Plating."

MEMBERSHIP

Los Angeles won the membership award for the First Division (125 members and over); Montreal led the Second Division (70–125 members), and the Branch in the Third Division (10–69 members) which showed the greatest membership gain was Southeastern.

The Society approved the 1956–1957 budgets as presented by Dr. Heiman, Budget Chairman. In doing so, they accepted Alternative Plan No. 1 with respect to the publishing of this year's Technical Proceedings (see AES News).

Dr. Wiesner Accepts the Precious Metal Award from Pres. Kelly

As Horelick talks to the Opening Session Pierdon, Astin, Blum, Kelly & Schaefer listen

View of Officers at Final Business Meeting with John P. Nichols at the podium

Candee Addresses the Past Presidents

A Standing Ovation is given Dr. Schaefer

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LONG LIFE Replacement schedules will be extended greatly because of the long life of Z-B-2!

BRILLIANT PROMAT'S latest advancement in zinc brighteners gives a beautiful, lasting, decorative finish that cannot be duplicated!

VERSATILE Z-B-2 can be used in still and barrel solutions, semi and fully automatic machines!

COMPATIBLE This great new product of PROMAT'S has been carefully designed to be completely compatible in ALL zinc solutions!

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Your assurance of rapid action...fast diffusion

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thorough in every detail

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42 STONE STREET — STORTS WELDING COMPANY INCORPORATED — MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

At the Baseball Game

Los Angeles was overwhelmingly selected as the site for the 1960 Convention despite the efforts of Boston, Philadelphia and Pittsburgh. Philadelphia's strength lay in the fact that the Branch will be observing its 50th Anniversary in that year.

T. Trumbour and R. Hazucha were elected to honorary membership of this Society by unanimous vote.

ELECTION OF NATIONAL OFFICERS

Dr. Samuel Heiman of the Philadelphia Rust Proof Corp. was elected President of the Society and all other incumbents moved up a notch. Ralph D. Wysong, Studebaker-Packard, South Bend, Indiana, was elected 3rd Vice-President. Ezra Blount, Editor of "*Products Finishing*," Cincinnati, installed the new officers. President Heiman presented the Past Presidents' Pin to Clyde Kelly.

EDUCATIONAL SESSIONS

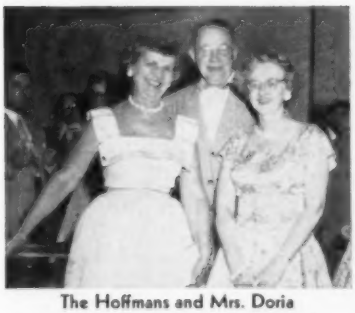
A total of forty-two papers were presented at five educational sessions. All sessions were dual and were well attended and well received. Chairman of the sessions include: E. R. Bowerman, Jr., Sylvania Electric Products, Inc.; Dr. R. B. Saltonstall, The Udylite Corporation; J. Teres, Wright Air Development Center; Dr. Earl J. Serfass, Lehigh University; F. L. Scott, Metal & Thermit Corp.; C. H. Sample, International Nickel Co.; Dr. W. A. Wesley, International Nickel Co.; G. A. Lux, Oakite Products, Inc.; Arthur Logozzo, Nutmeg Chrome Corp. and Dr. William Blum.

Dr. and Mrs. Janis with Manistedt

Mr. & Mrs. J. Palik

Stutz and Belke

Prize Winners Scheible and Shyne



The Hoffmans and Mrs. Doria

The Logozzos enjoy the Show

Dr. Swift stops to chat with the Heimans and the Marcovitches

TANK HEATING PROBLEMS ELIMINATED!

CLEPCO FUSED QUARTZ IMMERSION HEATERS

Heating your acid tanks with Clepco Electric Immersion Heaters is the most modern and now the most proven of all methods known today.

ASK YOUR LEADING PLATING SUPPLIERS

OVER 100,000 INSTALLATIONS PROVE *CLEPCO* FUSED QUARTZ IMMERSION HEATERS ARE BEST

Clepco Steel and Stainless Immersion Heaters are designed to meet the specific demands of the Alkaline Bath heating problems of the Industry.

WHEN A BETTER HEATER IS MADE, CLEPCO WILL MAKE IT.

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SEE YOUR PLATING SUPPLY HOUSE
WRITE US FOR LITERATURE

THE CLEVELAND PROCESS COMPANY

1965 EAST 57TH STREET • CLEVELAND 3, OHIO

Yosh Kazz Ukai of Tokyo

Mr. & Mrs. J. Duffy

Mrs. Adele Ferguson of Stamford, Conn. can't hold still as Dave Clarin gives her a Bracelet at Aunt Ella Party

Mr. & Mrs. John Bunsic

Pres. S. Heiman, Brig. Gen. D. W. Heiman and their families

Gilbert, Badalaco and Missel chat with a friend

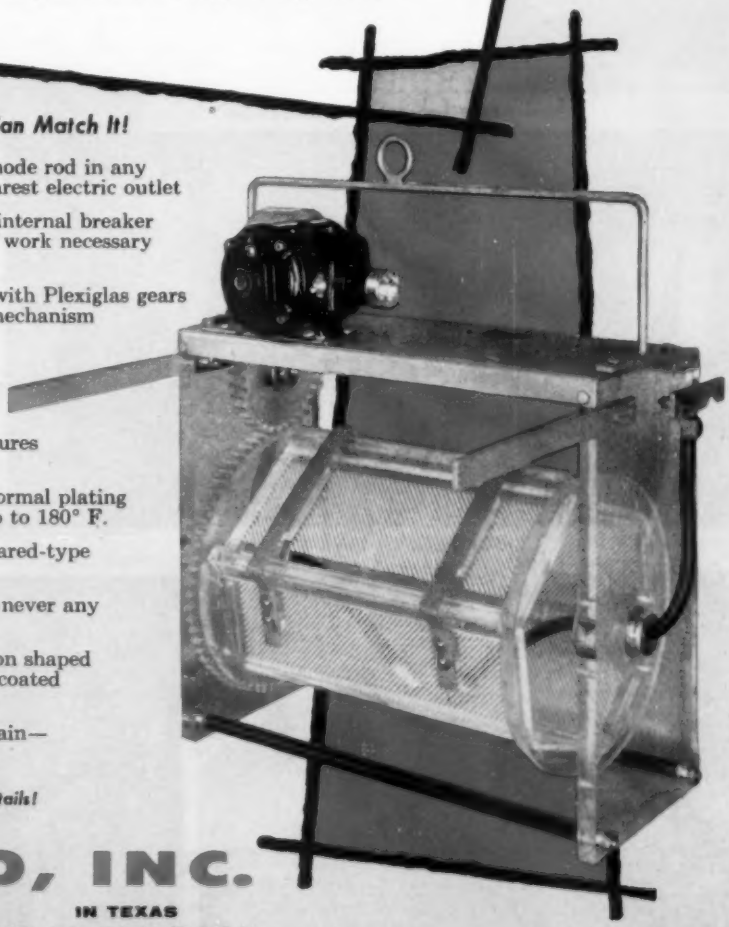
At MFSA Dinner Stutz, Couch, Ledford and Hazucha

The Heimans and the Blums stop to chat

Better, Faster, Lower Cost Plating of Small Lots!

NEW! LASALCO'S Model 9 x 15 Utility BARREL PLATER

with High Temperature Plexiglas Cylinder



No Other Plater At Its Price Can Match It!

- Easy! Just hang it on the cathode rod in any plating tank and plug into nearest electric outlet
- Hexagon shaped cylinder has internal breaker strips to insure interchange of work necessary for more uniform plating
- Positive smooth 3-gear drive with Plexiglas gears eliminates plate-up on drive mechanism
- Dragout loss is cut to a minimum because barrel rotates as it is lifted from solution
- Double flexible connection insures positive contact
- Plexiglas cylinder resists all normal plating solutions and temperatures up to 180° F.
- Rugged, specially designed geared-type motor
- Nothing plates but the load—never any tree-up on cylinder
- Cylinder size 9″ x 15″. Hexagon shaped with removable door. Plastic-coated spring-type latches
- Easy to clean—easy to maintain—economical to operate

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The Pierdons at the Reception Desk

At the Glover's table at the Banquet

Les Borchert is surprised in the crowd

Barsoom, Stabile & Son

SOCIAL PROGRAM

The social program could be divided roughly into three sections—the General Program, the Ladies' Program and the Children's Program. Both the planning and the execution of these programs does great credit to the chairmen and to the convention Branch.

The ladies' program is reported elsewhere, but a word must be said of the children's program: In the wonderfully educational city of Washington, a better program for the entertainment and education of the children could not have been planned anywhere. Day after day, under excellent supervision, the conventioneers' children were escorted on perfectly planned tours through the buildings, scenic spots and government installations.

Monday found conventioneers conferring on the open house sponsored by the MFSA in the Presidential and Congressional rooms. Open house chairman Tom Trumbour of Finishing Publications, Inc. and his committee deserve high plaudits for their efforts. There was dancing and fun till the early morning hours.

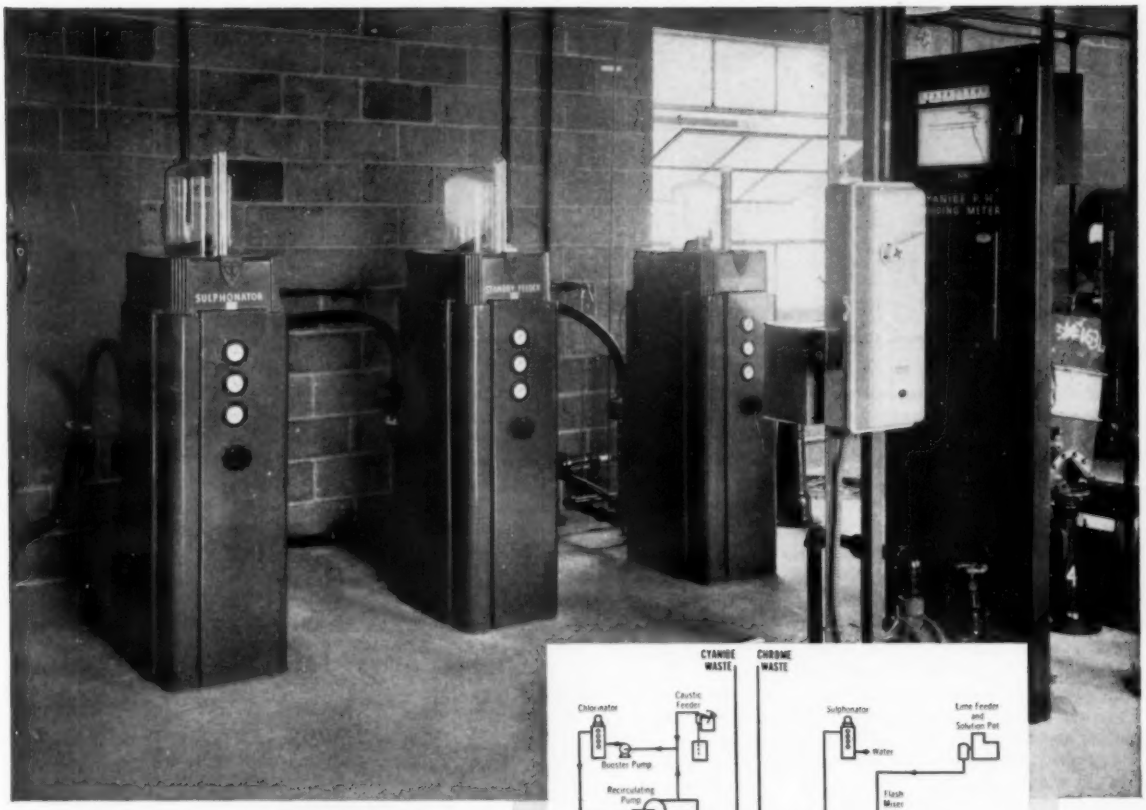
J. Duffy of Pennsalt Co. claimed golf enthusiasts at the Manor Country Club, Norbeck, Md. The tournament winners are reported in Intersociety News.

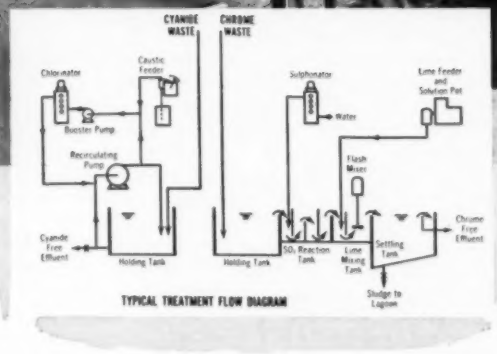
On the same day Baseball Diamond No. 25 at 25th Street and Connecticut Avenue, the East-West Baseball game took place. Since "East" and "West"

(*Continued on page 1058*)

Norris, Nadel, and the Saubestres

Our Canadian Hosts of '57:





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DAYSTROM INSTRUMENT DIVISION USES

W&T *Cyanide & Chrome Waste Treatment*

The Daystrom Instrument Division of Daystrom, Incorporated, located at Archbald, Pennsylvania, has provided a compact and efficient treating plant to destroy the toxic components of their plating waste. The treatment plant has been in continuous operation since 1953.

The cyanide bearing waste is treated with chlorine and caustic, using a W&T Water Diaphragm Chlorinator and a W&T Chemical Solution Feeder. The treatment breaks down the cyanide to harmless carbon dioxide and nitrogen gas components.

The chromium bearing waste is treated with sulphur dioxide and lime, using a W&T Sulphonator and a W&T Dry Chemical Feeder. The treatment removes the toxic chromium and other heavy metals from solution, to be disposed of as sludge.

If you would like more information on Wallace & Tiernan cyanide or chromium waste treatment, write for bulletin RA-2120-CP.

WALLACE & TIERNAN INCORPORATED

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1-52

Drs. Faust and Safranek accept the Carl E. Heussner Award from Pres. Kelly

are relative terms, in this case they represent territories east or west of the Hudson River. This placed high-ranking stars like A. Logozzo on the eastern team and left the West with young girls (the Pierdons and Miss Scott) and old men like George Burnley. Result—victory for the East, 15–9.

Wednesday evening's floorshow, dance and excellent entertainment with music by the Jack Morton Productions was a highly successful affair.

The annual banquet on Thursday evening brought to a fitting climax the week's activities. An excellent meal led to some dancing and a final round of visits to the entertainment headquarters of hospitable suppliers who contributed so much to the success of the 43rd Annual AES Convention. All in all, this will prove to have been one of the finest Conventions ever staged by the AES.

LADIES' PROGRAM

by

Frances M. Hoffman
(Mrs. August R.)

Greetings again, and many happy memories to all ladies who attended the 1956 Convention and to all the ladies who found it impossible to join us. The Capitol City executed a fine program of interesting activities, even the "cool" weather was "made to order." Now that it is over, and we are at home enjoying the pleasant memories, we want to think "out loud" for the benefit of the ladies who "couldn't make it." We are hoping that we can arouse in you, the desire and enthusiasm to meet with us next year in Montreal.

The Get-Together-Party on Sunday night was a very enjoyable one. Old friends and new friends exchanged enthusiastic greetings and chatting and laughter was heard everywhere. Tasty refreshments made the evening a perfect one.

The Opening Session on Monday morning was not only interesting but also educational. The keynote speaker, Dr. Allen V. Astin, Director of National Bureau of Standards, gave an enlightening talk about his department. This session is always for both Men and Ladies. We had a nice representation of the Ladies this year and the reports were very satisfactory.

The Ladies then hurried off to the grand ballroom of the historic Willard Hotel where a delicious "Welcome Luncheon" was served. Then followed a tour by bus through beautiful Washington and Alexandria—this was indeed a delightful trip.

Monday night was filled with fun and frolic. The International Fellowship Club open house, sponsored by the Metal Finishing Suppliers Association, again arranged an evening long to remember. The music, together with the delicious supper, stabilized with "cool drinks," was indeed a jolly affair and everyone reported a grand time.

Tuesday brought the Ladies together in the Terrace Dining Room of the National Airport. Reason? Of course! The much anticipated Aunt Ella Party sponsored by the Oakite Products, Inc. Dave Clarin again took over the lovely affair. A delicious luncheon was served, songs filled the air while Johnson tickled the piano keys. Dave Clarin did not forget to bring his usual gifts which he purchased in "Far-a-way Lands." "Lucky Ladies!", everyone exclaimed. Then too, Dave "remembered" several stories which he shared with us and which brought about many "chuckles."

Wednesday was indeed a day which we will never forget. We traveled by bus to Mount Vernon. We saw the "Changing of the Guard" at the Tomb of the Unknown Soldier in Arlington National Cemetery. A special Guard is selected for this specific honor, and the Tomb is never left unguarded. We were fascinated with Mount Vernon as we went through the house; saw the servants' quarters, examined the "wonders" in the beautiful gardens and visited the Tomb of our first President. The boat ride up the famous Potomac on our return was much fun. Although we did not bring back any "sunburn," we brought back many memories.

Wednesday evening was another highlight of the AES Convention. A good, wholesome Floor Show was enjoyed by everyone, which proves that people natually absorb "good" entertainment. The orchestra was superb and everyone danced into the "wee" hours.

Thursday brought our traditional Educational Session in the Grand Ballroom of the Mayflower Hotel. This lovely activity was sponsored by the Udylite Corporation. A very tasty luncheon was served and once again the Ladies added a chapter to their book on "Facts in Plating." Dr. Richard Saltonstall, The Udylite Corporation, Detroit, gave a truly informative lecture on "Plating Facts." This session has also become a "Must" in the Ladies Program—our motto still being, "We Yearn to Learn." Robert Trees hopes you will save your "coins" in the lovely coin purses and take a trip to Montreal.

Thursday afternoon brought the much anticipated "Plato Party" with Mrs. Joan Wiarda, the Guest Hostess. The ladies tucked away many lovely prizes as well as beautiful orchids from the Rapid Electric Company and a beautiful Ladies' gift—Courtesy of Baltimore-Washington Branch of American Electroplaters' Society.

The Annual Banquet on Thursday night was truly a lovely event. The food, the orchestra, the prizes—together with all the gracious people made this party a fitting climax for the 43rd AES Convention.

This ended the well organized, very ably executed convention which took place in the Capitol City of Washington and which we again declare to be the best Convention in 1956.

We felt that our charming Chairman, Mrs. Arthur G. Pierdon and her able committee, radiated a feeling of welcome. They demonstrated patience and courtesy at all times. In every instance, they were anxious to be of assistance to all of us. The Ladies are aware of the untiring efforts which were woven into this very successful project.

Again, in behalf of all the Ladies who attended the 43rd AES Convention, may I extend to Mrs. Pierdon and her Committee, a most grateful "thank you," and may it be resolved that their graciousness, hospitality and efforts be remembered as part of the 43rd Annual Convention which was so much fun for all of us.

And now, what is there in store for next year? Montreal promises to entertain the Ladies "Royally." Mrs. G. R. Davidson extended a warm invitation to all of us. From all the facts which we have gathered, the 44th AES Convention in Montreal will be the best in 1957. We will be looking forward to seeing you!

BEFORE YOU SAY "WE DON'T NEED IT"
LOOK INTO ALL THE ADVANTAGES OF
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(1) ROHCO 100 BARREL ZINC BRIGHTENER—for brilliant deposits, maximum coverage and lowest cost.

(2) ROHCO 303 STILL ZINC BRIGHTENER—for highest luster zinc, used with or without conversion or bright dips.

(3) ROHCO 150 BARREL ZINC BRIGHTENER—a very effective, stable powder for automatic and high capacity operations requiring clear, bright zinc.

(4) PERMA-BRITE BARREL ZINC BRIGHTENERS—for economical bright zinc plating. Deposits not quite so bluish as ROHCO 100.

(5) PERMA-BRITE STILL ZINC BRIGHTENERS—outstanding in lowest cost for large volume solutions; stable in the bath, completely soluble. The answer to automatic tank zinc plating. Easily used for conversion or bright dips.

(6) ROHCO ZINC PURIFIER—to keep baths in tip-top shape for unfailing quality and appearance.

FOR CADMIUM PLATING

(7) ROHCO SUPER XL—(Liquid or Powder) tops for producing the clearest, brightest barrel or still cadmium; minimizes cadmium usage by improving uniformity and speed of deposit.

(8) RODIP CD-3 and CD-4—single short-dip chromate post-plating treatment without leach for brilliant cadmium with good corrosion protection; CD-3 for automatic tank or barrel, CD-4 for manual operations.

(9) CAD-SOL—a heavy solution of cadmium cyanide for easiest bath makeup or maintenance.

(10) ROHCO CADIP—a new product used in final hot water rinse to speed drying and to prevent discoloration, especially upon baking to relieve hydrogen.

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(11) ROHCO SUPER NO-CRO-MIST®—safeguards workers' health by eliminating chrome fumes, solves ventilating and heating problems; saves chromic acid.

FOR ALL PLATING

(12) ROHCO RINS-AID "A" and "B"—water-shedder additions to rinse cycle to improve drying and to prevent staining; "A" imparts anti-wet, lustrous surface; "B" in final hot water rinse leaves clean surface.

(13) RECTIFIERS—for Hull Cell tests and/or plating operations. Complete range of capacities from 5 amperes up, with output to give 5% or less ripple. Optional automatic timers for 5 to 50 ampere units.

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(15) ELECTRIC HULL CELL AGITATOR—new-type oscillating variable-speed to reproduce tank operation.

(16) HULL CELL ANODES AND CATHODES.

(17) HANGING HULL CELL—the only available device for making Hull Cell plating tests under production conditions.

(18) ROHCO CURRENTESTER—enables platers to detect and correct the hidden troubles of rectifiers to maintain top-quality production. Improved Model C-3 with 3-inch screen and adjustable image size.

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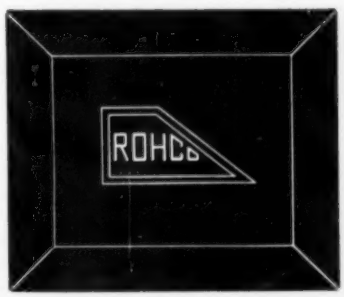

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Second Vice-President

THE AMERICAN ELECTROPLATERS' SOCIETY
1956-1957 OFFICERS

The men presented here are those named by the Supreme Society at its meeting at the Statler Hotel, Washington, D. C., Thursday, June 21, 1956 to lead the Society in 1956–1957. To all, PLATING extends its best wishes for highly successful service.

THE EDITOR

Ralph D. Wysong
Third Vice-President

Clyde Kelly
Past President

John P. Nichols
Executive Secretary

A. H. DuRose Succeeds L. C. Borchert As Research Committee Chairman

On Tuesday, June 19, the Research Committee met with more than 16 people present. One the first actions it took was to welcome Leslie Diveley, Russell Harr and Leland Morse as newly appointed members of the Committee.

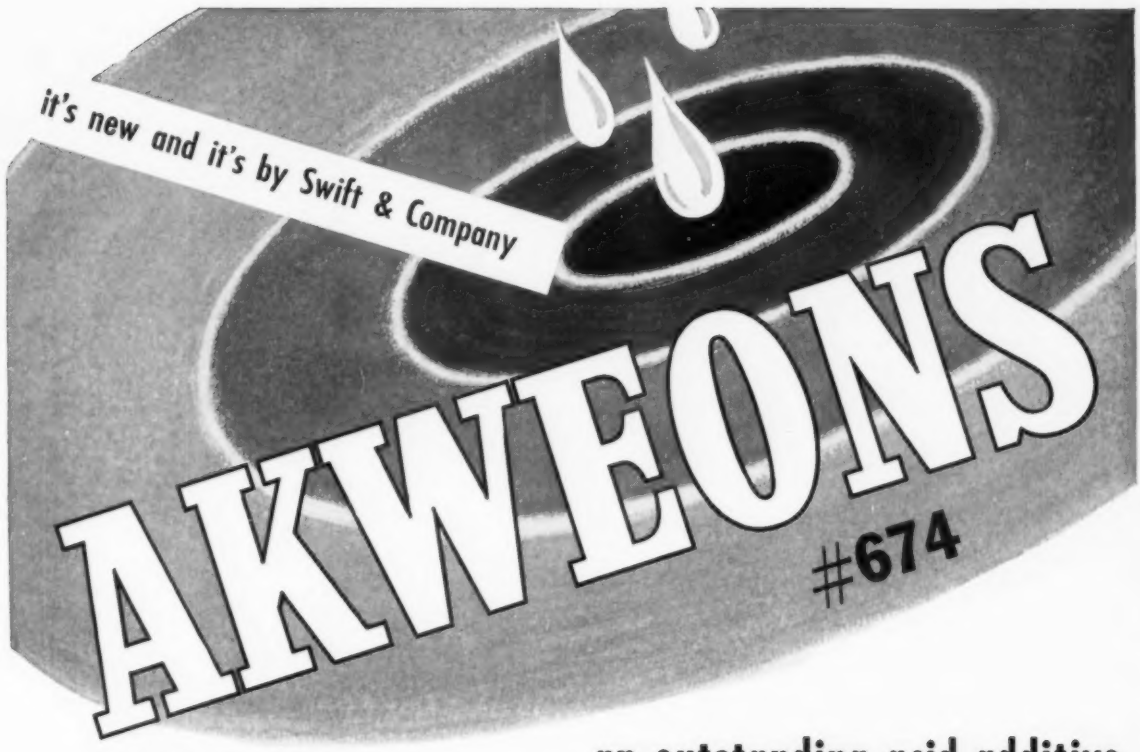
On a motion made by Dr. E. Parker and seconded by A. P. Wrisberg, Arthur A. DuRose was elected Chairman for the current fiscal year. The retiring chairman, L. C. Borchert, turned the gavel over to A. DuRose as the Committee's new head.

DuRose

Borchert

A. DuRose announced the appointment of R. A. Ehrhardt as Vice-Chairman in charge of Research and A. P. Wrisberg as Vice-Chairman in charge of Finance.

C. H. Sample of the ASTM B-8 Research Committee was introduced by A. DuRose as the liaison member to the AES Research Committee. It was the con-



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AKWEONS #674 is a new wetting agent and emulsifier developed for use in sulphuric, hydrochloric or phosphoric acid baths. While the basic purpose of AKWEONS #674 is to retard attack by the acid on the parent metal without affecting the acid's action on surface impurities, it also exhibits excellent fume depressant and rust preventive properties. The overall results therefore are a great reduction in fuming, substantial acid savings and less weight loss in the metal being bathed.

There is only one way to find out what AKWEONS #674 can do for you and that's by a trial in your own plant. Use the coupon below to get full information on the special introductory trial offer. It's easy and inexpensive and we believe you'll find that . . .

ONE TRIAL IS BETTER THAN A THOUSAND CLAIMS

Here are the important features of AKWEONS #674:

- Rust preventive properties
- Helps retard corrosion
- Fume depressant
- Helps minimize loss of base metal to acid attack
- Can be used in small quantities
- Saves acid (according to users)
- Soluble in acid, alkaline or neutral solutions

Swift
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To Serve Your Industry Better

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For information on a trial order. There is no obligation — except that AKWEONS #674 be used as directed to insure optimum results.

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sensus of opinion that the AES reciprocate by naming a representative to ASTM's B-8. Dr. R. Harr was appointed by A. DuRose.

All of the business of the Research Committee was taken up—such as finance, emblems, research folder, budgets and the various projects. Among other things, A. Wrisberg's report as Vice-Chairman of Finance pointed out that Sustaining Memberships had shown a gain during the preceding year and have now reached 374.

All in all, the Research Committee was off to a good start and much is expected of its accomplishments this coming year.

Technical Proceedings of the AES 1956

One of the big questions before the 43rd Annual Convention of the AES was how to publish the Annual Technical Proceedings of the Society. There are more than twice the number of technical papers presented at the educational sessions than have ever been presented before. The caliber of these papers and their length make such demands on space that it was inadvisable to follow the 1953 publishing policy.

The proposals were reduced to three alternatives:

1. To maintain the status quo; namely, to publish all the articles in PLATING magazine between June and December 1956 and then include the whole in a hard-bound volume with a tentative production date of December 1.

2. To rescind the policy adopted at the 1953 convention and publish none of the Convention articles in PLATING magazine but to publish them in their entirety in a hard-bound volume tentatively scheduled for publication in mid-October.

3. To publish the entire group of Convention articles as an insert in the September issue of PLATING magazine. This plan called for no production of a hard-bound volume but made available to those members who wanted it a binding service at a nominal cost.

These suggestions were discussed at some length by the Supreme Society, the Editorial Board, the Executive Board and nearly all the members present at the Convention. At the final meeting of the Supreme Society on Thursday, plan No. 2 above was finally adopted. This plan, though costly, does reduce costs appreciably over No. 1 above. It fulfills the spirit of the By-laws and provides to all the members the hard-bound copy of the Annual Technical Proceedings of the Society.

Chicago Incentive Plan For Authors

Dr. R. Harr, at the Editorial Board meeting of June 18 in Washington, D. C., amplified his original report on the incentive plan for authors which has now been adopted by the Chicago Branch. He pointed out that this plan is substantially similar to the Grand Rapids plan.

Harr

"The Chicago Branch shall grant an Award of $100.00 to a member in good standing who presents a paper at an Annual Convention of the American Electroplaters' Society or who has a paper published in the magazine PLATING.

"The Chicago Branch will grant an Annual Award of $100.00 to a Branch member in good standing who has the best paper published in any magazine on any subject related to the metal finishing industry. The review and judging of papers considered for this award shall be the function of a committee consisting of the Librarian and two other members appointed by the President.

"Awards shall be made annually on Ladies' Night. The first papers eligible for an award will be those published after January 1, 1957."

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CONSISTING OF

1) Udylite Hydraulic Full Automatic—overall dimensions 32′ x 7′ x 9′ 6″ high, tanks 42″ deep. Present cycle, which can be changed—1. Cleaner 2. Rinse 3. Etch (Koroseal Lined) 4. Chrome Plate (Koroseal Lined) 5. Reclaim (Koroseal Lined) 6. Rinse 7. Hot Rinse (Lead Lined).
2) 10 Wagner Tiedeman 1500 ampere at 9 volt Selenium Rectifiers with separate controls and starters.
   1 Udylite 1500 ampere—with starter, no control.
3) 200 Racks for Chrome Plating Piston Rods.
   Complete rack storage conveyor 90′ long.
4) 3000 lbs 4″ x ¼″ Bus Bar, 1800 gal. CRS110 Chrome Solution, complete blower system, 100 round chrome anodes, all temperature controls, starters, new coils, etc.
5) 2 Baird 3D Drainage Barrels
6) 2 Hammond OD-9 Tube Polishers
7) 2 Divine 10 HP Floating Heads
8) 1 Stearns Magnetic Chip Separator

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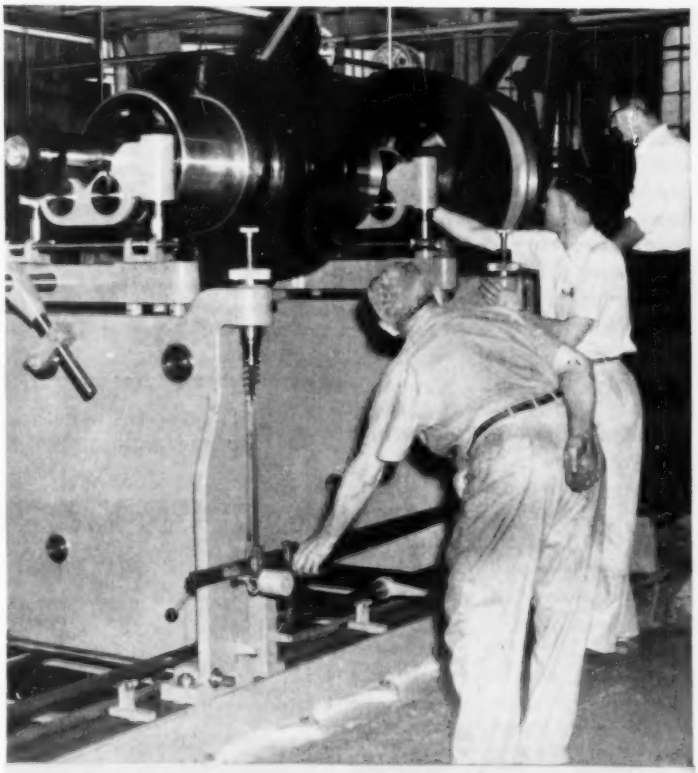
Massive motor generator rotors weighing thousands of pounds are balanced to within fractions of an ounce by this modern equipment in the Chandeysson plant. By spinning the rotors, even the slightest out-of-balance is detected and can be corrected. The result is vibrationless dc equipment that promotes perfect commutation and reduces installation cost . . . advantages that can never be obtained by static balancing such as is common in the industry.

Precision methods such as this are used throughout the Chandeysson manufacturing operation. Unified responsibility for the manufacture of every component . . . from selected raw materials to the finished product . . . is in the hands of skilled men with decades of experience in building low-voltage generators. Our aim in engineering is to *prevent* design defects . . . rather than to correct for them. This is why more and more "Industry Leaders Choose Chandeysson!"



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Bright clear finishes **can be produced in a cold, highly stable, acid solution in 15 seconds. Gives excellent corrosion protection or can be used as a base for clear lacquering. This treatment also produces bright iridescent or golden brown color by varying the cycle or concentration of the solution. Specify KENVERT No. 50.**

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AES NEWS

The Editorial Board in session. L. to R.: H. McAleer, J. B. Capuano, Dr. J. Kane, P. Coady, F. Fulforth, C. Kelly, S. Heiman, J. P. Nichols, Chairman, A. Logozzo, A. Doria, F. L. Scott, R. Harr, R. D. Miller, W. T. Tucker, L. Diveley and S. L. Doughty. (Brenner and Wiesner were busy with the Ed. Sessions of the Convention)

Editorial Board Adopts New By-Laws

On Monday, June 18, in Washington, D. C., the Editorial Board met with 18 persons present (see cut). The agenda of this meeting was so long that the meeting was divided into two parts and was continued the next forenoon on Tuesday, June 19.

Among the highlights of this meeting's accomplishments are the consideration of an incentive plan for authors, the current Paper Award system, the 1956 Technical

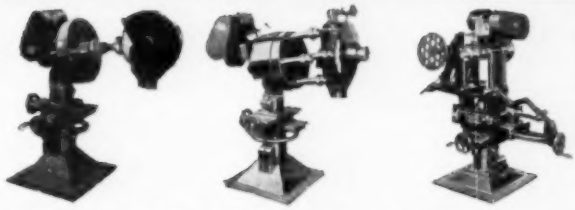
SCHOOLS OFFERING COURSES IN ELECTROPLATING

City	School	Instructor	Tuition Fee Per Semester	Course Length
Brooklyn, N. Y.	Brooklyn Evening Tech. High School	Louis Serota	None	18 wks.
Chicago, Ill.	Illinois Institute of Technology	J. M. Andrus	$45	18 wks.
Cleveland	John Hay High School.	T. Pavlish	$ 2.50	12 wks.
Detroit	Various Plants and Laboratories	Fred G. Brune	—	—
Hartford	State Trade School	Harry Sanders	—	—
Indianapolis	Purdue University Extension	Dr. A. M. Max	$45	16 wks.
Los Angeles, Cal.	University of Calif. Extension Division	M. Raskin	$27	18 wks.
New Haven	New Haven College	E. F. Foley	$42	15 wks.
Newark	Various Plants and Laboratories	Dr. Dodd Carr, Chairman	$20	11 wks.
Philadelphia, Pa.	Temple University	Dr. S. Heiman	$35	15 wks.
Providence, R. I.	Central Senior High School	J. A. Smith, Jr.	None	36 wks.
Rochester, N. Y.	Rochester Institute of Technology	W. F. Swanton	$28	15 wks.
St. Louis	Hadley Technical High School	Dr. Otto C. Klein	$ 9	15 wks.
San Antonio	Trinity University	W. P. Wisdom	$10	14 wks.
Toronto, Canada	Central Technical High School	A. R. Moores	$15-non-res. $ 5-city res.	6 mos.
Stroudsburg, Pa.	Jos. B. Kushner Electroplating School, 115 Broad Street (Corresp. Course)	Jos. B. Kushner	$125.	4 mos. to 1 yr.

ACME *Automatics* PUT POLISHING *and* BUFFING OPERATIONS *on a low cost production basis . . .*

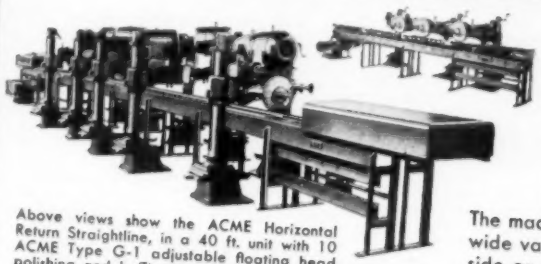
ACME *Semi-Automatics*

ACME Semi-Automatics are built to "deliver the goods." They can be fully relied upon to cut finishing costs, maintain production levels and stand up under long hours of operation!



The three ACME Semi-Automatics above are from left to right, the ACME A-2, a 2 spindle hand indexing machine for polishing and buffing cylindrical parts up to 12" diameter . . . the ACME L-4, a 4 spindle automatic indexing machine with a normal range of 250 to 400 indexes per hour . . . and the ACME D-10, an oscillating machine for finishing out of round parts. These machines are proved producers.

WRITE FOR CATALOG ILLUSTRATING WIDE RANGE OF TYPES



Above views show the ACME Horizontal Return Straightline, in a 40 ft. unit with 10 ACME Type G-1 adjustable floating head polishing and buffing lathes . . . and a 20 ft. unit with 3 ACME Type G-3 lathes.

ACME *Straight Lines*

ACME Straightlines provide effective solutions to many finishing problems. ACME progressive experience and engineering assure dependable performance at high production levels.

The machine illustrated is unusually versatile and adaptable to a wide variety of work. It may be loaded or unloaded from either side or either end. Polishing and buffing heads may be used on either or both sides and may vary in number to suit the required production and finish.

WRITE FOR OUR STRAIGHTLINE CATALOG ILLUSTRATING OTHER TYPES

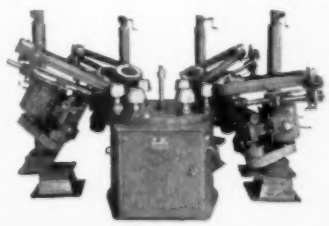
ACME *Rotary Automatics . . .*

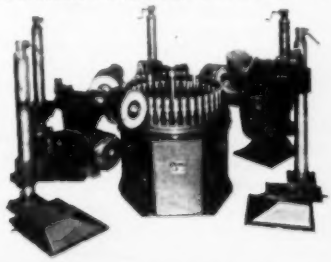
ACME 40" Rotary with 6 station indexing table and 4 ACME Type G-1 lathes with belt arm attachment. One second indexing time . . . up to 1800 indexes per hour. Acme Indexing Rotaries are available in table sizes from 18 in. to 10 ft. diameter.

ACME 10 ft. Combination Rotary . . . for continuous operation using 24 continuously revolving spindles or for 12 station indexing operation using every other spindle. One second indexing time . . . up to 1200 indexes per hour.

ACME 50" Continuous Rotary Automatic with 40 spindles equipped with 4 Acme Type G-3 heavy duty 15 H.P. polishing and buffing lathes with inverted spindles. ACME Continuous Rotaries are available with tables up to 24 ft. diameter.

WRITE FOR ROTARY CATALOG





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AES NEWS

Proceedings, By-Laws of the Editorial Board, Montreal Report, foreign technical developments, 1958 Cincinnati Convention Chairman's report.

In the matter of the By-laws, the amended and final version had been submitted for consideration to the Executive Board. They will have Board consideration at its meeting of September 29-30.

Phillip Coady reported on the preparations being made by the Montreal Branch for the 1957 Convention. After some discussion on the papers available, it was suggested that his address be included as part of the record: P. M. Coady, Rediweld Canada Ltd., 6301 Park Ave., Montreal, Canada.

The total number of sessions is to be limited to five (nondual) and will require no more than 15 to 20 papers. It was pointed out by L. Diveley that limiting the educational sessions to five single ones in number is in accord with the AES Convention manual.

The Editorial Board expressed thanks to the PLATING staff for its diligent efforts for the past two years.

John P. Nichols expressed the assurance to the Board that his concept of the character, purpose, quality and reliability of the magazine was in complete agreement with theirs, and that every possible effort would be made by A. Doria, G. Burnley, the PLATING staff and himself to produce a professionally top-grade PLATING at the least possible cost.

R. D. Miller, Educational Program Chairman for the 1958 Convention to be held in Cincinnati, reported that Convention Educational themes included: 1. Job Shops; 2. Topics for Platers who are not Platers; 3. Plating Classes; 4. Subjects of Interest to Nonplaters. His report indicated that much progress has already been made by the Cincinnati committees.

After brief parting remarks from Les Diveley and Fred Fulforth and a warm thanks from the chairman for the dedicated service these gentlemen had given, Art Logozzo offered a formal resolution of appreciation and commendation for these two gentlemen.

All in all, the meeting covered a vast spectrum of the problems encountered editorially by PLATING magazine of the AES.

President Heiman Announces New Committee Appointments

The following appointments were made in Washington.

Liason With Other Societies
(Inter-Society Representatives)
1956-1957

National Technical Task Committee on Industrial Wastes: Dr. C. F. Gurnham, Chairman; Dr. D. G. Foulke.

Inter-Society Corrosion Committee: Dr. W. A. Wesley

ORSANCO: William Neill.

Society for Plastic Engineers: Arthur Logozzo.

National Association of Metal Finishers: Arthur Pierdon.

Law Committee: G. W. Cavanaugh, Chairman; Manson Glover, Eugene Roth William Neill.

Credentials Committee: Fred Fulforth, Chairman; George Shore, C. F. Nixon.

Constitution and By-Laws Revision Committee: Dr. George P. Swift, Chairman; William Marcovitch, Paul Glab.

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+ Get your cleaning compounds at raw material costs plus a mixing fee.
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+ Get the value of our "know-how."
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– Don't pay for sales commissions!
– Don't pay for excessive promotions! (Advertising & Merchandising Overhead)
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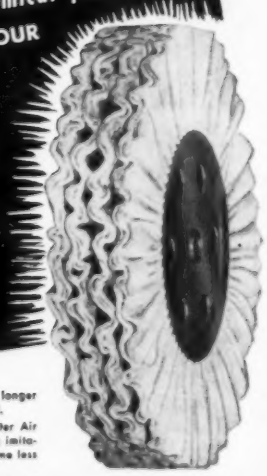

The buff you select is all important—it will mean longer buff life and greater production from a buff wheel.
Specify and buy the proven Schaffner Metal Center Air Cooled bias (type) Buff, and don't be satisfied with imitations. You'll find Schaffner buffs last longer, consume less compound and reduce rejections.
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* ALL-PURPOSE BUFFING COMPOUNDS * WHITE COLORING COMPOUNDS * NICKEL BUFFING (LINE) * EMERY CAKE * PLASTIC BUFFING COMPOUNDS * TALLOW GREASE STICK
* PUMICE GREASE STICK * POLISHING WHEEL CEMENT * STEEL POLISHING COMPOUNDS
COMPOUNDS MADE IN BAR, SPRAY OR PASTE

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provides BUFFING at its BEST—

And clean buffing, too, because in LEAROK there is no free grease to pack into crevices or recesses.

We say BUFFING AT ITS BEST because the same care in selection of abrasive bonding materials and in manufacture goes into LEAROK as into LEA COMPOUND, industry's leading greaseless abrasive compound.

The name LEA has a special reputation throughout the metal finishing field. That reputation covers a world wide service of helping industry to do better surface finishing at lower cost. Each of the many LEA products, of which LEAROK is but one, aims straight for that target.

Every bit of knowledge and experience with problems of finishing metals, plastics, etc., gained over many years of service goes right into our manufacturing methods and into the selection of materials.

LEAROK is outstanding in quality and buffing effectiveness. If better buffing at lower cost is one of *your* targets, why not investigate and test for yourself the merits of LEAROK? Since we have some 45 different grades, please send with your request for a trial sample full details of your operations so that we can select the proper grade. Send samples of the work, if you can.

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing and polishing compounds for over 30 years.

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Lea Mfg. Company of Canada, Ltd., 1236 Birchmount Road, Scarborough, Ontario, Canada
Lea Mfg. Company of England, Ltd., Buxton, England
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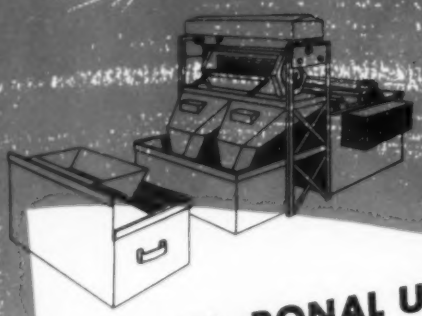
Lea Copper-Glo has a new partner



LEA-RONAL Ultra-Tartral combined with LEA Copper-Glo means that LEA-RONAL High Speed Bright Copper Process is so vastly improved as to be practically a new process.

Here are a few of the new features this new combination will give you:

- freedom from burning in spite of much higher current density
- 50 to 100 percent higher current density (Hull Cell 0-100 asf) over that *permissible* in any former cyanide copper process without reduction of *efficiency*
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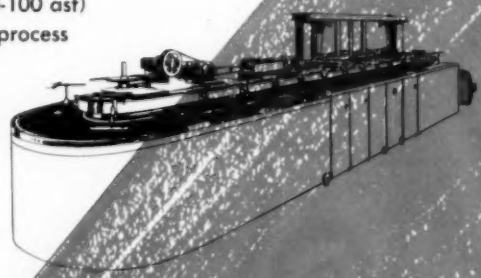
- sodium cyanide may be used with higher current densities than is possible with an equivalent potassium *formulation* without Ultra-Tartral; this means real economy
- improved anode corrosion
- carbonate tolerance is even greater than ever before; no need to control carbonate.



This new and improved LEA-RONAL High Speed Copper Plating Process offers so much in the way of improved operations and economy that you should make at least a trial run. We suggest that you set aside one tank or section for comparative tests. Our technical staff can recommend a formulation for converting your present cyanide bath to this improved LEA-RONAL Process.

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BRANCH NEWS

CHICAGO

Hesler Helps Close the Season Fittingly

Despite an early summer heat wave and the interference of vacation schedules, Chicago branch had a surprisingly good attendance at its last regular meeting of the year held on June 8. Considerable credit should be given to the speaker, **J. (Jim) C. Hesler*** of Industrial Filter & Pump Mfg. Company, and to his subject "Recovery and Treatment of Metal Finishing Wastes."

Hesler was a very capable speaker and made a good coverage of his subject. To aid the members in following the discussion and to carry home the important points, he passed out pamphlets pertinent to the points under discussion. He discussed the various types of waste materials usually handled, principally nickel, chromium, and cyanide type solutions, and how they could best be recovered or disposed of. Undoubtedly all of the members were impressed with the seriousness of the problem and the fact that it can be solved. Throughout his discussion he reflected his excellent academic background, broad experience and thorough knowledge of his subject, without losing sight of the very practical applications of the methods.

The lively question period which followed the talk was a good indication of the interest aroused by the speaker and his topic.

All members were encouraged to attend the National Convention in Washington, and reminded that the presiding officer of this year's convention, **Clyde Kelly,** is a member of Chicago branch, and that among the many excellent papers to be presented was one, "Gold-Silver Alloy Plating," by two members of Chicago branch, R. E. Harr and A. G. Cafferty of Western Electric Co., Inc.

Several comments were heard to the effect that Dick Saltonstall of Udylite Corporation made a very good presentation of his subject, "The Role of ASTM Committee in the Electroplating Industry" at the May meeting of the branch.

All members were wished a happy vacation time and reminded that they should not forget to send their dues to the Secretary before they take off for that fishing trip.

Joseph Corré
Publicity Chairman

*Manager of the Waste and Water Treatment Division of the Industrial Filter & Pump Mfg. Company in Chicago, directing a program of extensive research into the handling of plating wastes and related problems.

CINCINNATI

A Bang-up Picnic Ends the Year

The Cincinnati branch held its annual picnic on June 8 at Stricker's Grove. Fifty-six members attended the gala affair. The focal point of the afternoon and evening was the softball game between the "Suppliers" and "Platers." The "Suppliers," captained by Dick Evans, had too much for Evans Foertemeyer's "Platers." The final score: "Suppliers" 16—"Platers" 3. It is felt that sales in the Cincinnati area will probably fall off for a few weeks.

After the game, everyone heartily went after the fried fish, potato salad, cole slaw, etc. The evening was completed with pinochle and poker. The picnic Committee, consisting of **Del Taylor, Roger Winterman** and **Charley Dumont,** did a bang up job in arranging a very enjoyable afternoon and evening for all.

David L. Kaplan
Secretary

AES SUSTAINING MEMBERS NIGHT MEETING

Patrick J. Driscoll reports the following on AES Sustaining Members Night Meeting:

Howard McAleer, President of Formax Manufacturing Company, the new Detroit Branch President succeeding Lee Morse, Chrysler Corporation, opened the last Spring AES meeting at 8:30 P.M. in the Michigan Room of the Statler Hotel with approximately 120 members and guests present.

Manuel Ben, General Motors Corporation Technical Center, the new First Vice-President was elected by the executive committee to replace Bob Racine, who is transferring from the local branch to take up a new position as District Sales Manager with Clevite Corporation in California. He was formerly with Wyandotte Chemicals as Sales Manager. The Detroit chapter paid particular credit to Bob on the outstanding job he had done during his tenure in office. Manuel Ben has been very active in AES work, both in our local chapter and in the formation of the Saginaw Valley Branch.

General comments made by President McAleer were that the delegates were to go to the convention uninstructed and that P. Peter Kovatis had resigned his position as Executive Secretary of the AES. Credit was given to the 49 sustaining members of the local chapter for their contributions to furthering the research program of the chapter and Les Borchert, National Chairman, AES Research Committee, gave the current status of the research projects which can be found in the current publication of PLATING. Les also mentioned that by writing to the National Office of the AES any sustaining members, as well as any member, can find out how their money is being appropriated to the various research projects.

Seven new members were voted into the chapter which brings the Detroit Branch to a total of 681 members.

Doug Thomas, Educational Chairman, was introduced and then turned the program over to the Technical Chairman of the evening, C. D. Sparling, President of C. D. Sparling Electroplating Company. Sparling introduced the first speaker of the evening on the Symposium of Waste Treatment.

David Kahn, City of Detroit Engineers Office, and Lyle Reading, Detroit Department of Building and Safety, spoke on "Detroit Waste Regulations." Specifications can be obtained from the city and they mentioned that wastes should be treated before they reach the sewage disposal plants. A minimum of pH 5 and maximum pH 10 will be accepted with no more than 5–6 ppm of cyanide.

R. W. Parker, Engineer, Michigan Water Resources Commission, spoke on "Michigan State Waste Regulations." He mentioned that each disposal problem stands on its own and that home rule takes precedent. All new plants that have plating wastes for disposal must file statement of what disposals they will have with the Water Resources Commission. If not, penalties are severe. In the Detroit area, Gerald Calhoun, Trenton Disposal Plant, can be contacted on disposal problems.

Dr. Louis Weisberg, Consultant New York City, spoke next on "Recovery vs Disposal." A few important facts he mentioned were that alkalis and acids can be handled separately from any CN or CR wastes. CN wastes can be handled most effectively by evaporative rinse waters and this also may be applied to chromic acid wastes with the aid of ion exchange.

With proper rinsing, which is counter flow to direction of work in multiple station rinse tanks, a minimum amount of waste is present with a minimum amount of operation cost. Tests made were published at the last AES Convention.

Dr. Weisberg further stated that cyanide can possibly be recovered for 8.12 which is less than it can be purchased for. Great strides have been made in waste disposal recovery, enough so that it can appear economical.

President McAleer then paid particular tribute to Anthony Partensky, Douglass-Lomison Company, who was elected to Member Emeritus. Partensky has been a member of the Detroit chapter since 1915, and he gave the chapter a brief picture of the plating trade in his younger years.

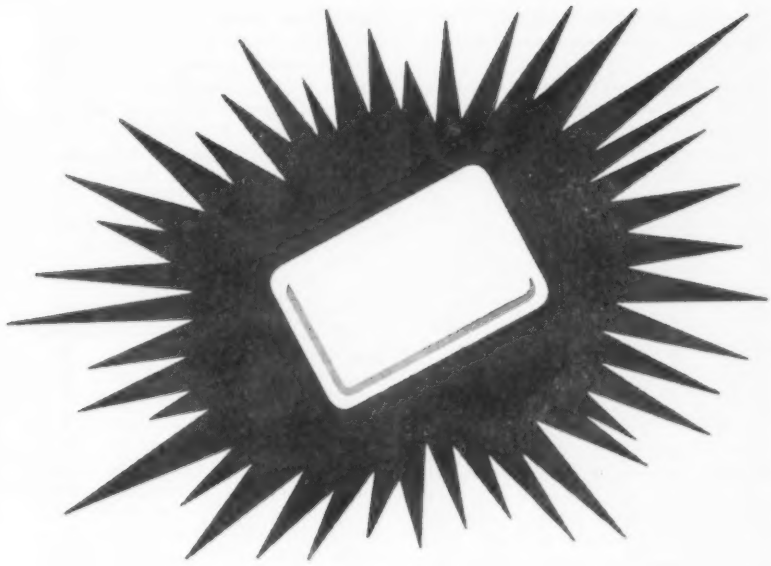
The meeting was adjourned at 10:45 P.M. to informal gatherings and the serving of refreshments.

LOS ANGELES

The Delegates Succeeded

The monthly branch meeting was held June 13, 1956 at Rodger Young Auditorium in Los Angeles, with 93 members and guests in attendance.

New



Du Pont "CYANOBRIK"

Offers usual high quality of Du Pont sodium cyanide PLUS... low sulfide content.

A new form of sodium cyanide from Du Pont is available to the electroplating industry. Called "Cyanobrik" the product comes in 1 oz. pillow-shaped briquettes. "Cyanobrik" sodium cyanide offers the usual high quality and excellent performance characteristics of regular Du Pont sodium cyanide in the plating of various metals. In addition, the new product features extremely low content of sulfur (as sulfide), 0.0005% or less by specifications.

For use in cyanide electroplating solutions... particularly effective in sulfide-sensitive electrolytes.

"Cyanobrik" is desirable for cyanide electroplating solutions normally using sodium cyanide—including copper, zinc, and cadmium. Its almost-negligible sulfide content makes it especially attractive for use in sulfide-sensitive electrolytes such as proprietary bright copper baths, when economic considerations make the use of sodium cyanide preferable to potassium cyanide. "Cyanobrik" is not suitable for use in molten heat treating baths, and should not be used for this purpose. "Cyanegg", "Cyanoflake" and "Cyanogram" sodium cyanides are readily available for heat treating applications.

"Cyanobrik" is available in the same price range as other Du Pont forms of sodium cyanide. It is available in 100 and 200 pound net drums.

E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Delaware.

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BRANCH NEWS

After President **L. Truman Stoner** opened the meeting, followed by introduction of guests and the reports given by the secretary and treasurer, 14 potential members were introduced by 1st Vice-President **George Magurean.** The president then initiated four new members into our branch—**Raymond W. Karczynski, P. E. Parham, John A. Vernier** and **Matty Carraro.**

A new addition to our branch, **Joseph Simon,** formerly of the Bridgeport branch, was introduced by the president and was presented with a Past-President's pin.

Our Librarian, **Emmett Babcock,** was affronted with a last minute dilemma. It appeared that our guest speaker for the evening, **Kenneth C. Johnson,** field engineer of Industrial Filter & Pump Mfg. Co., of Chicago, was unable to attend the meeting due to an out-of-town commitment. At the last moment Babcock and the officers improvised an impromptu panel, consisting of our members:

Gilbert Extale, of General Electric Co., Ontario, Calif.; **Tony Stabile,** of Associated Plating Co., Los Angeles; **Earl Arnold,** of L. H. Butcher Co., Los Angeles, each selected because of their knowledge of filters and filtration. This subject was in line with the scheduled program.

The president, before closing the meeting, reminded us of the Washington, D. C., convention, and wished our delegates luck on the 1960 convention campaign. He also announced an executive meeting for July and wished all of us a happy vacation time.

Frank Virgil
Secretary

MISSISSIPPI VALLEY

Morrison Talks on Ion Exchange

The Mississippi Valley branch held its June 1956 meeting at the Tower Restaurant in Moline, Illinois, on the 13th. The meeting was preceded by a dinner.

The meeting was called to order at 9.00 P.M., with **Lloyd Gilbert** in charge. Gilbert immediately introduced **Wally Morrison** of Illinois Water Company, the speaker of the evening. Morrison's topic was "Modern Methods For Prevention of Stream Pollution with Toxic Metal Finishing and Heat Treating Wastes."

The speaker stated that Iowa, Michigan, and Pennsylvania are ahead of other states in laws governing stream pollution abatement. The maximum allowable pollution is about as follows: A maximum of 1 ppm of metal ion contamination, and with the maximum cyanide of 0.1 ppm.

To demonstrate the use of ion exchange, the speaker introduced a glass of strong copper sulfate solution into a small cation exchange. The blue color was lost and to show the absence of Cu in the effluent, he took a drink.

Morrison cited the use of cationic exchange resins in the purification of chromium plating and aluminum anodizing solutions as is done at Rock Island Arsenal. He also cited their application in the recovery of anions and cations from rinse waters, in which both the ions and the water are salvaged.

Morrison explained how ion exchange may be used in cyanide waste control, in which application both anionic and cationic resins are used. He also cited the use of sulfonic resin in the removal of carbonate from cyanide plating baths.

The use of a new polynonelectrolyte flocculating agent was demonstrated. A liter of a suspension of clay in water was immediately flocculated by only a few drops of a dilute solution of the polynonelectrolyte.

A question and answer period followed during which many interesting points were discussed. The chair thanked Morrison for his fine talk.

The meeting adjourned at 10.30 P.M.

NEWARK

Eighty Members Attend!

The June 9 meeting of the Newark branch was held at the Hanson-Van Winkle-Munning plant in Matawan after

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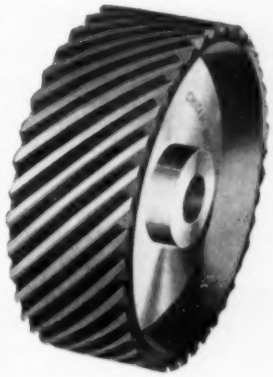

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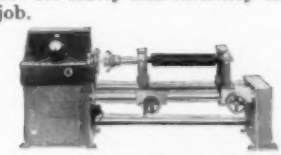

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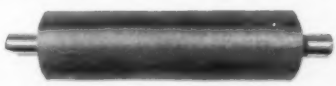

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BRANCH NEWS

a dinner attended by over sixty members and friends at the YE Cottage Inn. The dinner was so much enjoyed that the plant visitation under the direction of **James Viola, Ross Lyons, Clint Ivins** and **Ray Dennison** got off to a late start. As a result, at the conclusion of the visitation to the generator and rectifier manufacturing facilities, it was decided that the double-barrelled program calling for Ross Lyons to discuss "Generator Applications" and Clint Ivins to talk on "Rectifier Controls" would be postponed until some later date.

Ross Lyons and a group in the generating plant

Secretary **Foulke** announced the receipt of a communication from President

Jim Viola talks on rectifiers to Tom Austin and Wm. Grigat

Kelly announcing the appointment of **John Nichols** as new Executive Secretary. **Walden Casler, Joseph Cirello, Jack Gubnitsky, William Jubanowsky, Patrick Kearns** and **George Urucinitz** were elected to membership.

President **Struyk** announced the appointment of **Flavio La Manna** as editor of Newark Sparks and thanked **Al Korbelak** for a job well done over the past several years. **Milton Stevenson,** secretary of the Syracuse branch and **Joseph Cheung** of Hong Kong were introduced to the members. Treasurer **Wagner** reported all bills paid and the audit of the 1955–1956 books to be done at the next educational committee meeting on June 27th.

The secretary announced that it was with deep regret he had to report the passing of **Frank Barile**—a long-time member of the branch.

The condition of Past President **Myron Diggin** who was stricken with a heart attack early in the week was reported good and regrets expressed that he could not attend the meeting.

The meeting concluded with the better than eighty members and guests enjoying an hour of refreshment courtesy of the Hanson-Van Winkle-Munning Company.

D. Gardner Foulke
Secretary

NEW YORK

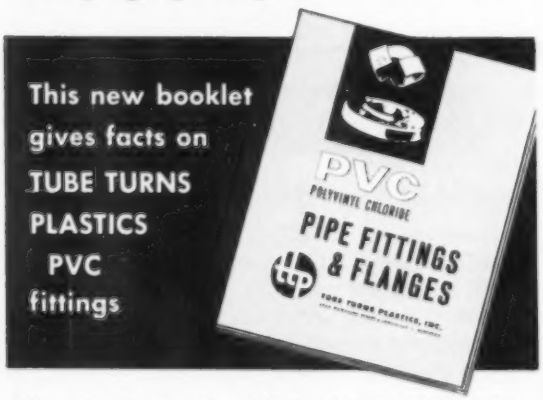
Ellsworth Candee Talks on Buffing Compounds

The meeting was called to order by 1st Vice-President **George Herrmann.** The minutes of the previous meeting (May 11th, 1956) were read and approved. One application for membership was received, that of **Rosario V. Giambalvo,** and it was moved that it take its usual course.

It was reported that **Martin Lapin,** who is now convalescing, wishes to thank his many friends at the branch for their thoughtfulness. He is also very grateful to those who personally visited him at the hospital in which he was confined.

A motion to cancel the second meeting in June of this year was unanimously approved.

Stop piping corrosion!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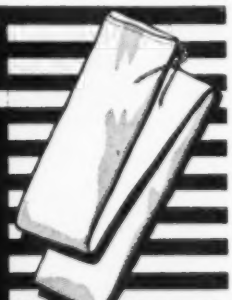

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One company responsibility is important...

there are no loose ends on an Industrial installation . . . no *recommended* auxiliary parts . . . no subsidiary engineering problems left for you to solve. Industrial stands squarely behind the operating efficiency of each complete system.

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This ion-exchange system at the Sunbeam Corporation, Chicago, removes sulfuric and boric acids from plating rinse wastes. It recovers gold and nickel salts and continuously returns pure water to the rinse system. It not only yields substantial savings in metal and water but also improves the quality of plating.

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BRANCH NEWS

Librarian **Joseph Rembecki** presented **Ellsworth Candee** of the Lea Mfg. Co. who spoke on "Trends in Buffing Compounds" and other news of interest in the polishing field. In his talk, Candee discussed the melting point of buffing compounds, the chemistry of the binder, the strength of the binder and the penetration power of the compound. Several samples of various types of binders were distributed for examination by the members. He then compared the bar compound with the comparatively newly developed liquid buffing compound which he explained, however, is best suited for automatic polishing set-ups.

In summing up, Candee expressed the following advantages of liquid over bar compounds. 1 Ultimately more economical—no "nubbins." 2 Higher finish in most cases—more "cut" in some. 3 Definitely longer life for buffs. 4 Less hazardous for operators. 5 No binder problems—regarding temp., viscosity, etc.

The usual discussion period followed after which the speaker was given a rising vote of thanks.

Anthony P. Briganti
Recording Secretary

PROVIDENCE-ATTLEBORO

A New Slate of Officers is Presented

The Providence-Attleboro branch of the AES held their regular monthly meeting, May 21 at the Providence Engineering Society Building.

Pierre Lounsbury, president, called the meeting to order. **Daniel Turner** gave the Treasurer's Annual report for '55–'56. The Annual Secretary's report was presented by **Fred Sherman**. Both reports were accepted as read.

The June Party Committee, headed by **John Henry**, announced that the Annual Party will be held June 4, in Attleboro,

Testing For Causes of Rough Deposits?

By using a testing procedure it will be possible to determine chemical adjustment, addition agent control and bath treatment necessary to return the bath to normal plating. Such testing may also indicate the need for greater filtering capacity or for continuous filtering. If filtering is required on a laboratory scale to obtain satisfactory test results then filtering is required to obtain quality production plating.

Filtering Methods

method for filtering plating baths with a

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Mass. Notices will be mailed to all local members.

Louis Gagnon, of the Boston branch, AES, asked the Providence-Attleboro branch to support it in obtaining the National Convention for 1960. A vote was held to instruct the delegates to act in the affirmative on this point. A discussion was held by Gagnon and local members in regard to an interim meeting of the delegates to draw the local branches and the National Organization in closer contact.

The Nominating Committee, headed by **Gerald Noonan,** presented the following slate of officers for the year 1956–1957:

President, **Sibley Kershaw;** 1st Vice-President, **Leslie Ferguson;** Secretary, **Fred Sherman;** Treasurer, **Daniel Turner;** Librarian, **John Cahill;** Board of Managers, **Henry Shavier.**

The secretary was instructed to cast one ballot for the slate as presented.

Leslie Ferguson, librarian, introduced **C. H. Castle,** technical director of Roto-Finish Co. Castle presented many slides showing the various types and sizes of tumbling and other mechanical finishing machines. Some of the highlights were the deburring of plastic parts, the finishing of threaded parts and the improvement in mechanical properties of various metal parts finished by the barrel method.

Ferguson then introduced **Robert Tiers,** of the W. D. MacDermid Chemical Corp., who spoke on the subject—"Cleaning Methods." Tiers discussed the very practical problem of trouble shooting, alkaline cleaners and methods of evaluation, soils, and new cleaning methods. His talk was very instructive to the practical plater.

A question and answer period was held. The meeting adjourned at 10:30 P.M. after a rising vote of thanks for both presentations.

F. L. Sherman
Secretary

For Metal Finishers!

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TO CAP STUD SIZE	3/32-5/32	5/32-3/16	3/16-1/4	1/4-5/16	5/16-3/8	3/8-7/16	5/16-1/2

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BRANCH NEWS

ST. LOUIS

New Officers Elected

The May meeting of the branch was held at the York Hotel on May 9. The business for the evening consisted of election of officers and delegates.

Louis Berra, chairman of the nominating committee, suggested the following slate: President, **Robert Coulson;** 1st Vice-President, **Craig McAlister;** 2nd Vice-President, **William George;** Secretary-Treasurer, **Ward Kelly;** Sergeant-at-Arms, **Theo Soukup;** Librarian, **Edward Seitl;** Board of Managers, **Ed Hunleth, George Koderhandt, Charles Hamm, Eugene Conroy, Jr.** The slate was unanimously approved.

Delegates: **Robert E. Coulson, A. P. Julius, Louis Berra.** Alternates: **N. K. House, H. J. Siegel, Craig McAlister.**

In addition to the offices above it was decided to elect **Richard Nyquist** publicity agent.

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Thompson's new Centri-F Acid Pump will safely transfer acids from small, open, storage and plating tanks as well as from standard carboys and drums. It is a self-priming, portable pump, driven by a specially designed, totally enclosed motor, and delivers a smooth, spurt-free flow of acid at the rate of approximately six gallons per minute. No acid remains in the pump when it is removed from the container. The pump is individually constructed of materials suitable to the actual acid to be handled.

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- NO RETURNABLE CONTAINERS—In 1 gal. jugs

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New, Exclusive Self-Priming
FILTER PUMP
300 GALS. PER HOUR

Model LSIN-20 portable, 65 lbs. 14" x 16" x 24" high

SERVICE — Filters any acid or alkaline plating solution from ph 0 to ph 14. Removes particles down to 1 micron.

DESIGN: Filter Assembly as illustrated in H.T. Lucite (also available in Stainless Steel 316, Haveg, Epoxy Resin, Rigid Vinyl, Saran, Polyethylene, Teflon). Filter tubes of cotton, dynel, porous stone or porous carbon. PUMP: Self-priming, Stainless Steel 316 (also available in an all plastic construction). Available as Centrifugal in Stainless Steel or Hasteloy. Motor is ¼ H.P., totally enclosed Ball Bearing. HOSE: acid and alkaline resistant. Base Platform: linen-impregnated phenolic laminate on rubber tire, ball bearing casters.

25 Stock Models to fit your needs. 50 to 2,400 gal./hr. cap. Others to your specifications.

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Regular use keeps zinc solutions constantly clear. Eliminates need for ANY OTHER purifying treatment. Brightens work.

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FUTURE MEETINGS

AES

September 28—Editorial Board Meeting, National Headquarters, Newark, N. J.

June 17-20, 1957—44th Annual Convention of the AES, Sheridan. Mt. Royal Hotel, Montreal, Canada.

May 19-22, 1958—45th Annual Convention of the AES, Sheraton-Gibson Hotel, Cincinnati, Ohio.

INTERSOCIETY

September 10-12—ASME Fall Meeting, Denver, Colorado.

September 16-21—Annual Meeting, American Chemical Society, Convention Hall, Atlantic City, N. J.

September 16-22—ASTM Electroplating Practices Symposium, West Coast Meeting, Hotel Statler, Los Angeles, California.

September 16-22—2nd ASTM Pacific Area National Meeting, Hotel Statler, Los Angeles, California.

September 17-21—ASME & Instrument Society of America, exhibit and joint conference, N. Y.

September 25-27—1956 Trade Fair of the Atomic Industry, Navy Pier, Chicago.

October 8-12—National Metal Congress and Exposition, American Society for Metals, Public Auditorium, Cleveland, Ohio.

October 21-24—34th Annual Meeting and 21st Paint Industries Show, Federation of Paint and Varnish Production, Netherlands Plaza Hotel, Cincinnati, Ohio.

October 28-November 1—Fall Meeting, Electrochemical Society, Inc., Hotel Statler, Cleveland, Ohio.

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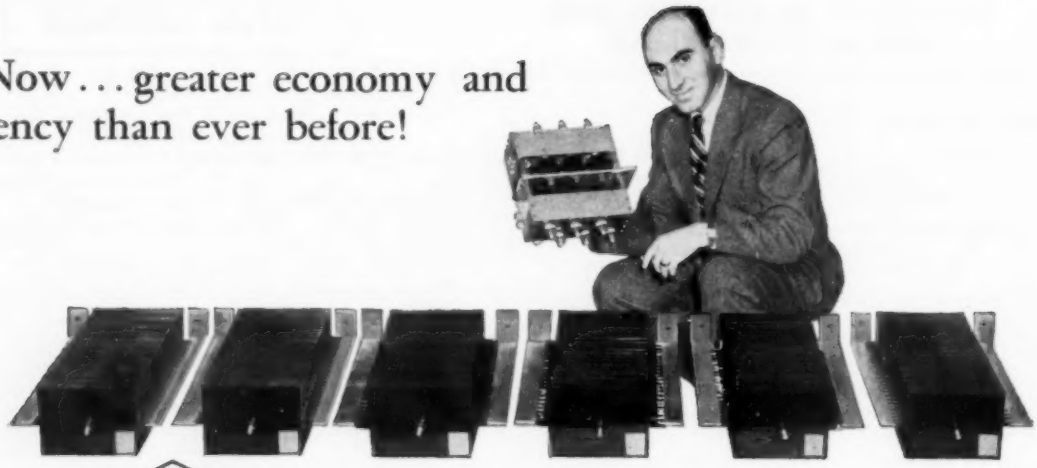

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